

# XPSMCWIN Configuration Software for XPSMC

11/2007



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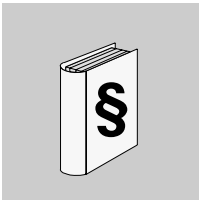
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# Safety Information



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## Important Information

### NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

### DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

### WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

### CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

**PLEASE NOTE**

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

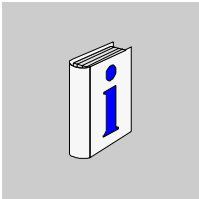
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# About the Book



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## At a Glance

**Document Scope** This manual contains the XPSMCWIN software description.

This program allows you to start, set up and diagnose the XPSMC safety controller from a PC.

The simple user interface lets you set up the XPSMC for a multitude of applications for the protection of hazardous areas near mechanical machines.

The XPSMCWIN software is used for the installation, documentation and fault diagnostics of your safety application.

**Validity Note** Eight versions of the safety controller are available:

Type	Characteristics
XPSMC16Z	8 control outputs and 16 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs add-in functions Modbus (RTU) communication and configuration port
XPSMC16ZP	8 control outputs and 16 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs add-in functions Profibus DP communication port Modbus (RTU) communication and configuration port
XPSMC16ZC	8 control outputs and 16 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs add-in functions CANopen communication port Modbus (RTU) communication and configuration port

Type	Characteristics
XPSMC16X	8 control outputs and 16 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs Modbus (RTU) communication and configuration port
XPSMC32Z	8 control outputs and 32 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs add-in functions Modbus (RTU) communication and configuration port
XPSMC32ZP	8 control outputs and 32 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs add-in functions Profibus DP communication port Modbus (RTU) communication and configuration port
XPSMC32ZC	8 control outputs and 32 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs add-in functions CANopen communication port Modbus (RTU) communication and configuration port
XPSMC32X	8 control outputs for 32 safety inputs 6 safety transistor outputs 2 x 2 safety relay outputs Modbus (RTU) communication and configuration port

This documentation is valid for XPSMCWIN under Microsoft Windows 2000/XP.

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## Related Documents

Title of Documentation	Reference Number
XPSMC - Hardware Manual	33003275

You can download these technical publications and other technical information from our website at [www.telemecanique.com](http://www.telemecanique.com)

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## User Comments

We welcome your comments about this document. You can reach us by e-mail at [techpub@schneider-electric.com](mailto:techpub@schneider-electric.com)

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# System Requirements and Software Installation

1

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## At a Glance

**Overview**

This chapter contains the system requirements for the software and hardware.

**What's in this Chapter?**

This chapter contains the following topics:

Topic	Page
System Requirements	12
Installation	14

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## System Requirements

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### Hardware

The following is required for configuring the XPSMC safety controller:

- XPSMC safety controller
- PC with the following capabilities at least
  - Pentium® processor, or equivalent
  - CD-ROM drive for the installation
  - mouse
  - free RS232 serial port with a 9-pin subD connector or USB-Port
  - 20 MB free hard disk space
- display: 800 x 600, 256 colors (1024 x 768 recommended)
- configuration cable
  - serial
    - XPSMCCPC adaptor
    - TSXPCX1031 serial adaptor
  - or
  - USB
    - standard (1:1) RJ45/RJ45 twisted pair Category 5D Ethernet cable Ref: 490NTW00002
    - TSXCUSB485 USB adaptor

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### Connection between the PC and the XPSMC Safety Controller

To set up and diagnose the XPSMC for faults with the XPSMCWIN software, you must establish either

- a serial connection from the PC to the XPSMC safety controller.

The following 2 cabling components are required to set up the connection

  - XPSMCCPC adaptor
  - TSXPCX1031 serial adaptor
- or
- an USB connection from the PC to the XPSMC safety controller.

The following 2 cabling components are required to set up the connection

  - Standard (1:1) RJ45/RJ45 twisted pair Category 5D Ethernet cable Ref: 490NTW00002
  - TSXCUSB485 USB adaptor

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### Software

The following are system requirements for the XPSMCWIN software:

- Operating system: Microsoft® Windows 2000/XP®
-

**Installing the  
USB Driver for  
the TSXCUSB485  
Cable**

The following table describes steps to install the USB driver for the TSXCUSB485 cable:

Step	Action
1	Download the driver from the Web site <a href="http://www.telemecanique.com">http://www.telemecanique.com</a> and search for USB Driver. <b>Note:</b> Additionally, the driver pack can be found on the Safety Suite V2 installation CD, within the ... <i>XPSMC Safety Controller\XPSMC Drivers for cable</i> folder.
2	Double click on ... <b>Driver Pack V2.3</b> .
3	Run the <i>Communication_Drivers_Pack_V23.exe</i> file.
4	Plug in the cable.
5	Select <b>Look for an adequate driver</b> .
6	Select <b>Other sources</b> .
7	Select the location of the driver on the hard disk.
8	The driver is installed.

## Installation

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### Installation Procedure

To install the XPSMCWIN software, you need the installation CD-ROM (included). If your PC does not have a CD-ROM drive, you can also copy the installation files on floppy disks and perform the installation. Proceed as follows:

Step	Action
1	Insert the CD with the current version of the Safety Suite (included) into the drive. Follow the installation wizard instructions to install the software.
2	In case installation does not start automatically, run the <i>setup.exe</i> file in the CD-ROM default directory, for example: <i>D:\setup.exe</i> (if <i>D:</i> is the letter corresponding to your CD-ROM drive).
3	The program is ready to be started for the first time

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# XPSMCWIN User Interface



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## At a Glance

### Overview

This chapter contains the description of the software user interface.

### What's in this Chapter?

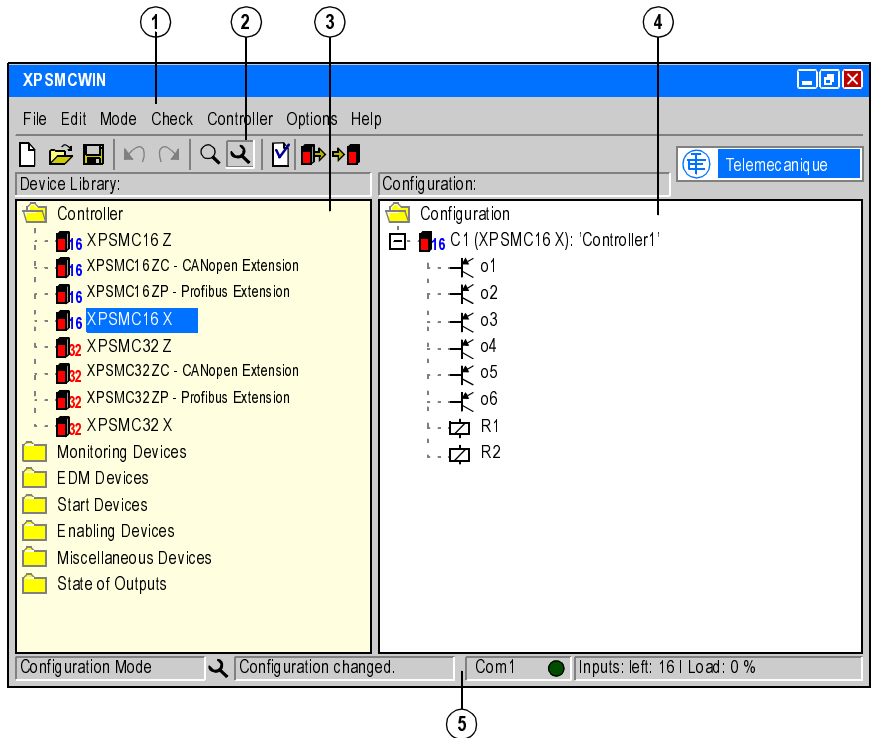
This chapter contains the following topics:

Topic	Page
Window Types	16
Elements of a Window	18

# Window Types

## Introduction

Typical XPSMCWIN user interface window



The items 1 to 5 have the following meanings:

Item	Meaning
1	Menu bar
2	Tool bar
3	Device library window
4	Configuration window
5	Status bar



## Device Library Window

This window contains the eight possible types of controllers (XPSMC16Z, XPSMC16ZC, XPSMC16ZP, XPSMC16X, XPSMC32Z, XPSMC32ZC, XPSMC32ZP, and XPSMC32X) and the library of all devices available.

A device is copied from this library into the **Configuration** window by pressing and holding down the left mouse button and simultaneously dragging the mouse.

## Configuration Window

This is the working window in XPSMCWIN. The configuration is defined and modified in this window.

All devices are configured by the following similar procedure.

If a device is moved in the **Configuration** window, a window appears in which the parameters of this device are selected. On the subject of these parameters, reference should also be made to chapter *Device Library*, p. 31.

**Note:** If this window does not open automatically, this means that this device is not active in the **Options editor** menu option. In this case, open the window by clicking with the right mouse button on the symbol and selecting the **Properties** option.

The following commands can also be called by clicking the right mouse button on the symbol in the **Configuration** window:

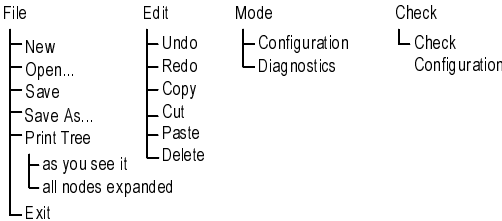
Command	Description
Properties	Open the <b>Properties</b> window of the selected device.
Copy	Using this command, a device can be copied with the properties assigned to it and pasted elsewhere in the configuration tree.
Cut	Cut the selected device.
Paste	Paste a copied or cut device as a copy or as a new device into the selected location.
Delete	Delete the selected object.
Delete incl. copies	Delete the selected object and its copies.
Mark copies	Mark all the copies of the selected device.
Unmark copies	Clear all the copies of the selected device.
Expand all	Expand the entire configuration tree.
Expand controller	Expand the selected controller tree (only visible when more than one controller are in the current configuration).
Collapse all	Collapse the entire configuration tree. Only controller will be shown.

# Elements of a Window

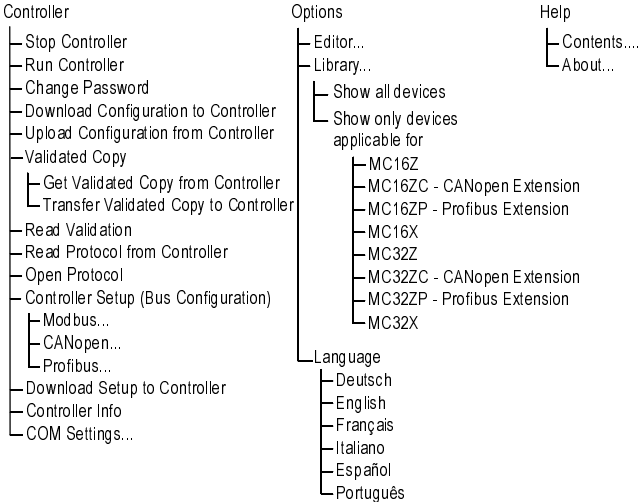
## Menu Bar

The menu bar contains all the commands of the XPSMCWIN software as shown in the structure overview below.

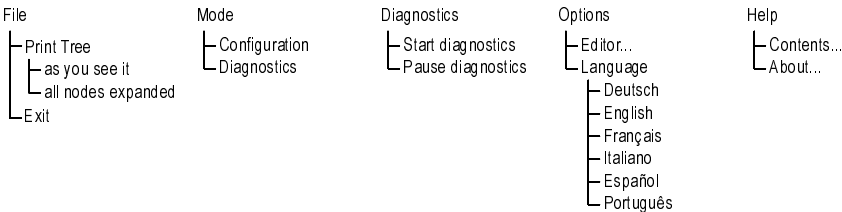
### Menu bar for Configuration mode



### Menu bar for Configuration mode (continued)



### Menu bar for Diagnostics mode



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# Menu Commands



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## At a Glance

**Overview** This chapter contains the description of the menu commands.

**What's in this Chapter?** This chapter contains the following topics:

Topic	Page
File	20
Edit	21
Mode	22
Check	23
Controller	24
Options	27
Help	28
Diagnostics	29

---

## File

---

### New

Click **New** to create a new configuration. When this command is called, a new window appears in which the name and the author of this configuration can be indicated. A message box appears for saving an existing configuration if a configuration is already opened.

To enable opening the **Properties** dialog window automatically, after you drag and drop a device onto the **Configuration** window, select option **automatically open properties dialog if a new device is dropped onto configuration** in **Editor** on the **Options** menu.

---

### Open

Click **Open** to open a file selection popup menu. Here you can select an existing configuration. Additionally a backup file is created in the same directory with *.mcb* extension.

---

### Save

Click **Save** to save the current configuration under the current name.

---

### Save As...

Click **Save As...** to save the current configuration under a new name.

---

### Print Tree

Click **Print Tree** to print the configuration, and choose one of the following options:

Option	Meaning
as you see it	The configuration tree will be printed as you see it in the configuration window.
all the nodes expanded	The configuration tree will be printed with all the nodes expanded.

---

### Exit

Click **Exit** to quit the XPSMCWIN software. If changes have been made to the configuration, you will be asked whether you want to save changes before quitting the program.

---

## Edit

---

**Undo** Click **Undo** to cancel the last action. You can repeat the step up to 10 times in a row.

---

**Redo** Click **Redo** to restore a cancelled action. You can repeat the step up to 10 times in a row.

---

**Copy** Click **Copy** to copy the selected item to the internal clipboard.

---

**Cut** Click **Cut** to cut the selected device.

---

**Paste** Click **Paste** to paste an item from the internal clipboard to the selected location, and choose one of the following options.

Option	Meaning
as a copy of the device	The device will be copied with the properties of the source device (e.g., the same input and output) if the same hardware is connected to different inputs and outputs of the XPSMC.
as a device	The device will be copied with its default properties. Alternatively, you can drag the device to the selected location.

---

**Delete** Click **Delete** to delete the selected item.

---

## Mode

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### Configuration

The **Configuration** mode is the software's working mode. All the commands can be executed in this mode. In the Configuration mode, a configuration is created, modified, and sent to or reloaded from XPSMC. When the program is started, this is the default mode of the software.

---

### Diagnostics

The **Diagnostics** mode is used exclusively for diagnosing the XPSMC connected to the PC. The configuration cannot be modified. In the Diagnostic mode, the software working windows are grey in color.

In this mode, the connected XPSMC safety controller continues to operate without being affected.

---

## Check

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### Check Configuration

Use this command to check if the configuration is correct, before you download it into the XPSMC.

---

## Controller

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<b>Stop Controller</b>	Click <b>Stop Controller</b> to stop the XPSMC. Its safety outputs are de-activated in accordance with their stop category, (either immediately or with a delay). The password must be entered.
<b>Run Controller</b>	Click <b>Run Controller</b> to change the XPSMC to Run mode.
<b>Change Password</b>	Click <b>Change Password</b> to open a window in which you can change the password. Beforehand, you will receive a message saying the controller has been stopped
<b>Download Configuration to Controller</b>	<p>Click <b>Download Configuration to Controller</b> to send the current configuration to the selected controller. Prior to it, you will receive a message that the controller has been stopped. The password must be entered.</p> <p><b>Note:</b> Please bear in mind that when the configuration is downloaded, all outputs will be deactivated.</p>
<b>Upload Configuration from Controller</b>	Click <b>Upload Configuration from Controller</b> to load the configuration to the PC and display the current configuration of the connected XPSMC. The XPSMC is still running at the same time.
<b>Create Validated Copy from Controller</b>	Click <b>Create Validated Copy from Controller</b> to create a file as safety copy of a validated configuration.
<b>Transfer Validated Copy to Controller</b>	Click <b>Transfer Validated Copy to Controller</b> to transfers a validated configuration to a controller.
<b>Read Validation</b>	Click <b>Read Validation</b> to provide the date of validation and the name of the person who performed the validation of the connected XPSMC configuration.
<b>Read Protocol from Controller</b>	Click <b>Read Protocol from Controller</b> to upload the protocol of the current configuration and present it in a text (not ASCII) format. It allows you to store the protocol on your PC or to print it out. Before you use the command, stop the XPSMC and enter your password. Restart the XPSMC after you have closed the protocol.

<p><b>Note:</b> As the protocol is read from the Controller, all outputs are deactivated.</p>
---

---



**Open Protocol**

Click **Open Protocol** to open a locally stored copy of the protocol and print it out. The file is read-only, and you cannot modify it.

**Controller Setup  
(Bus  
Configuration)**

Click **Controller Setup (Bus Configuration)**, and choose one of the following options:

Option	Meaning
Modbus (RTU)	Opens a window for adjusting the settings required for the operation of all the XPSMCs (up to 8) of this configuration with a MODBUS system. Operation with different MODBUS systems is also possible. By clicking the <b>Download</b> button, the <b>Send the settings to the controller</b> command is executed. The settings are applicable to all controllers.
CANopen	Opens a window with address and baud rate.
Profibus DP	Opens a window with address only.

**Download Setup  
to Controller**

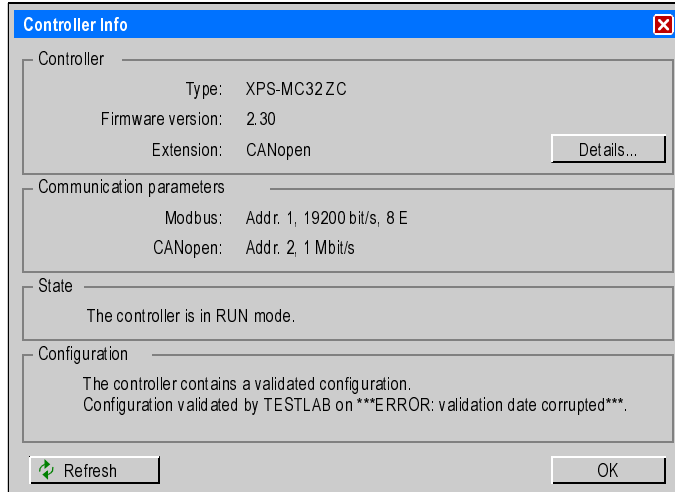
Click **Download Setup to Controller** to send the parameters set (for all communication protocols, i.e. Modbus (RTU), CANopen, Profibus DP) to the selected controller of this configuration. The XPSMC must also be stopped. The password must be entered.

**Note:** This command causes only the bus communication parameters to be sent and not the configuration!

**Controller Info**

Click **Controller Info** to display the information about the type of controller, the firmware version, and the controller status.

To view information about the current firmware version of the Controller 1, Controller 2, and the fieldbus, click **Details**:



---

**COM Selection...**

Choose **COM Selection...** to select the COM port (1...16) of the PC to which the XPSMC is connected.

---

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## Options

### Editor...

Click **Editor...** to open the **Editor Options** dialog box, which allows you to check the **automatically open properties dialog if a new device is dropped to configuration** function.

### Library

Click **Library** , and select one of the following options:

Option	Meaning
Show all devices	All devices are shown.
Show only devices applicable for	Only the applicable devices of the XPSMC model are shown.

### Language

Click **Language** to select the XPSMCWIN software language.  
The software switches automatically to the selected language.

## Help

---

### **Contents...**

Click **Contents...** to view an overview of the online help.

---

### **About...**

Click **About...** to view information about the present version of the software.

---

## Diagnostics

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**Start Diagnostics** The transmission of the diagnostics data from the XPSMC to the PC will be started.

---

**Stop Diagnostics** The transmission of the diagnostics data from the XPSMC to the PC will be stopped.

---

**Note** Switching into the diagnostic mode, with menu command **Mode** → **Diagnostics**, the menu bar will be modified like described in the chapter *Elements of a Window*, p. 18.

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## At a Glance

**Overview** This chapter contains the description of all the functionalities of the XPSMC. These functionalities are contained in the **Device Library** window in the configuration software.

**What's in this Chapter?** This chapter contains the following sections:

Section	Topic	Page
4.1	Controller	33
4.2	Monitoring Devices	51
4.3	EDM Devices	97
4.4	Start Device	98
4.5	Enabling Devices	100
4.6	Miscellaneous Devices	103
4.7	State of Outputs	113

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# 4.1                      Controller

## At a Glance

**Overview**                      The folder *Controller* contains the 8 types of controllers: XPSMC16Z, XPSMC16ZC, XPSMC16ZP, XPSMC16X, XPSMC32Z, XPSMC32ZC, XPSMC32ZP, and XPSMC32X.

**What's in this Section?**                      This section contains the following topics:

Topic	Page
Creating a Configuration	34
Setting the Safety Outputs	47
Connecting a Device to a Safety Output	49
Modifying the Properties	50

## Creating a Configuration

---

### Introduction

To create a configuration, click **File** → **New**.

**Note:** The following examples are for 16 input controllers only. The procedure for 32 input controllers is the same, if it is not otherwise stated.

### Response Time

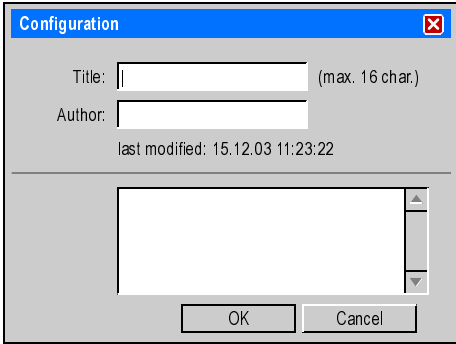
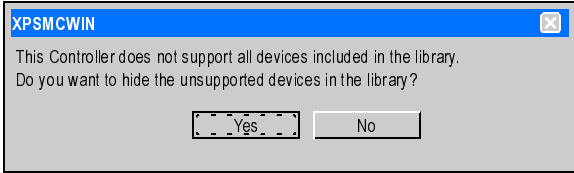
You have the possibility to select a response time for the XPSMC16Z, XPSMC16ZC, XPSMC16ZC, XPSMC32Z, XPSMC32ZC, XPSMC32ZC devices. You can select 20 or 30 ms for the response times. With the longer response time you can configure more functionality in the device.

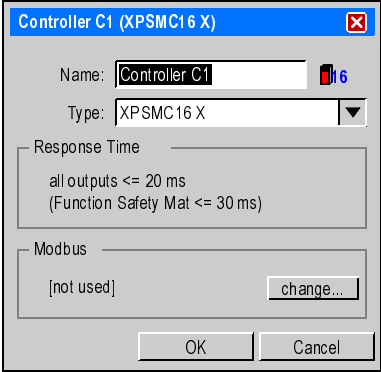
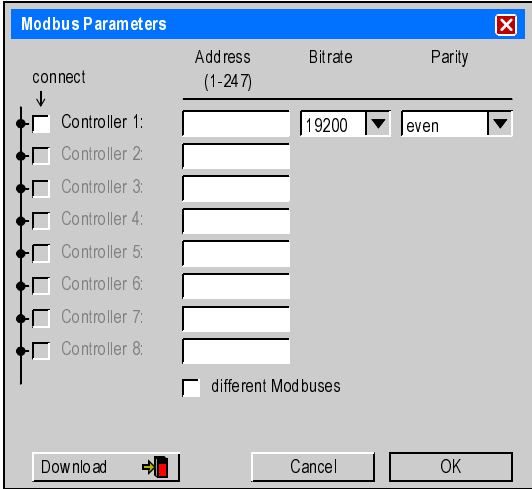
In the XPSMC16X and the XPSMC32X this possibility does not exist. Here the response time is always 20 ms.

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Procedure for  
XPSMC-X Using  
Modbus

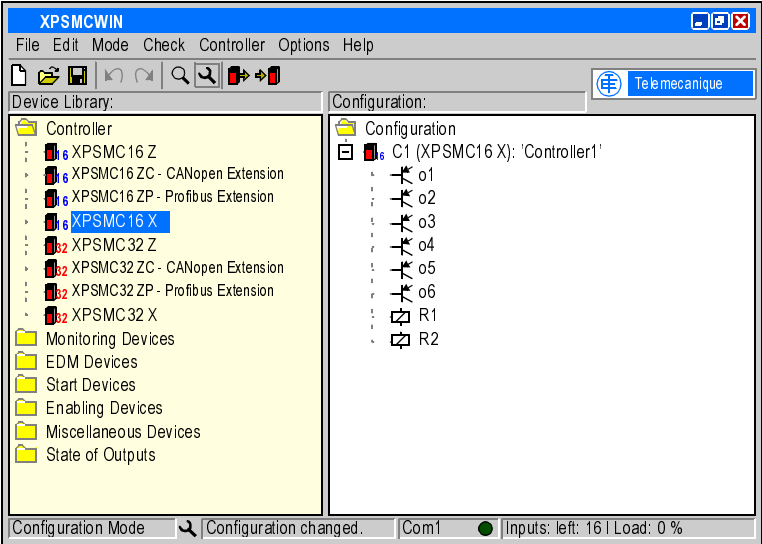
Proceed as follows:

Step	Action
1	<p>To create a new configuration, click <b>File</b> → <b>New</b>.</p> <p><b>Result:</b> A window which contains the <b>Title</b> and the <b>Author</b> of this configuration opens.</p> <p>The following figure shows the <b>Configuration</b> dialog box:</p> 
2	<p>Fill out the fields and click <b>OK</b>.</p> <p><b>Note:</b> If this window does not open automatically, this function is not active in the <b>Options</b> → <b>Editor...</b> menu option.</p>
3	<p>Drag-and-drop the controller symbol onto the <b>Configuration</b> window.</p> <p><b>Note:</b> Because the X version does not support all the devices, the following window appears:</p> 

Step	Action
4	<p>Select <b>No</b> to see all devices in the library. You can also make this selection in the <b>Options</b> menu.</p> <p><b>Result:</b> A dialog box with Modbus marking appears.</p> <p>The following figure shows the <b>Controller C1 (XPSMC16 X)</b> dialog box:</p> 
5	<p>Click <b>change...</b> to modify bus parameters.</p> <p><b>Result:</b> The Modbus parameters dialog box appears.</p> <p>The following figure shows the <b>Modbus Parameters</b> dialog box:</p> 

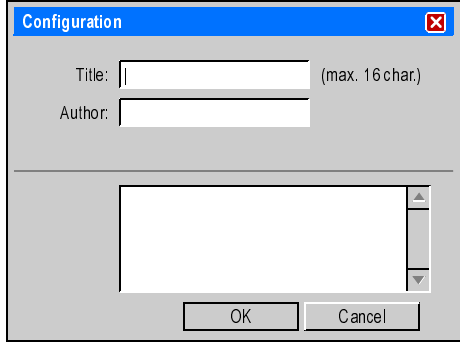
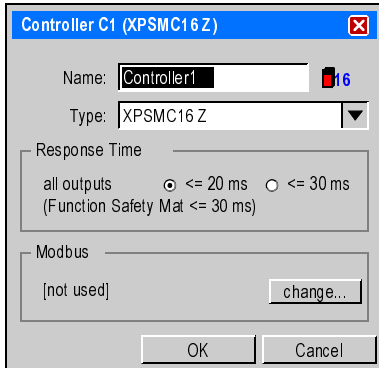
This window also opens when all the other controllers in this configuration are added. Enter all necessary parameters.

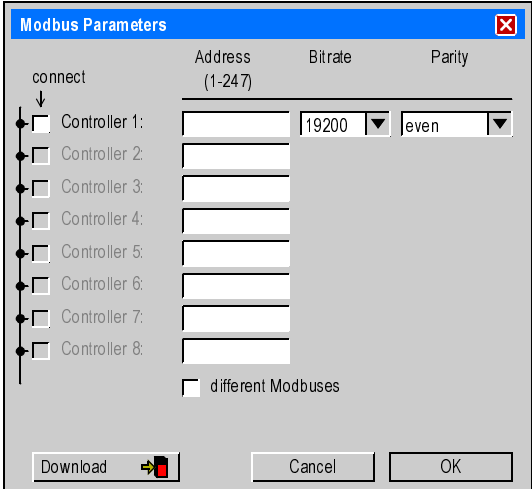
**Note:** This window can also be accessed by clicking with the right mouse button on the controller symbol and then selecting the **Properties** option or **Controller** → **Controller Setup (Bus Configuration)** if the **Modbus** option is available.

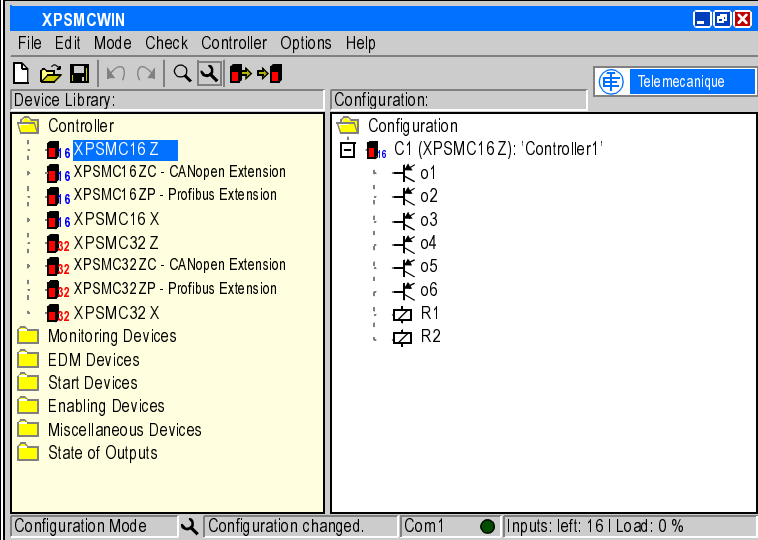
Step	Action
6	<p>Select the <b>Download</b> button.</p> <p><b>Result:</b> You must select the controller that your configuration corresponds to. Only the bus parameters for this controller will be transmitted.</p> <p><b>Note:</b> To download the whole configuration including the bus parameters, click <b>Controller</b> → <b>Download Configuration to Controller</b>.</p>
7	<p>After having closed the properties window of the controller, the controller will be represented in a tree structure.</p> <p>Example: All devices of the XPSMCWIN application:</p>  <p>The screenshot shows the XPSMCWIN application window. The title bar is blue with the text 'XPSMCWIN'. Below it is a menu bar with 'File', 'Edit', 'Mode', 'Check', 'Controller', 'Options', and 'Help'. A toolbar contains icons for file operations and a 'Telemechanique' button. The main area is divided into two panes. The left pane, titled 'Device Library:', shows a tree structure with folders like 'Monitoring Devices', 'EDM Devices', 'Start Devices', 'Enabling Devices', 'Miscellaneous Devices', and 'State of Outputs'. Under the 'Controller' folder, several XPSMC models are listed, with 'XPSMC16 X' selected and highlighted in blue. The right pane, titled 'Configuration:', shows a tree structure with a folder 'Configuration' containing a sub-entry 'C1 (XPSMC16 X): 'Controller1''. Below this, a list of outputs (o1, o2, o3, o4, o5, o6) and relays (R1, R2) is displayed. At the bottom of the window, a status bar shows 'Configuration Mode', a message 'Configuration changed.', 'Com1', a green indicator light, and 'Inputs: left: 16   Load: 0 %'.</p>

## Procedure for XPSMC •Z Using Modbus

Proceed as follows:

Step	Action
1	<p>To create a new configuration, click <b>File</b> → <b>New</b>.</p> <p><b>Result:</b> A window which contains the <b>Title</b> and the <b>Author</b> of this configuration opens.</p> <p>The following figure shows the <b>Configuration</b> dialog box:</p> 
2	<p>Fill out the fields and click <b>OK</b>.</p> <p><b>Note:</b> If this window does not open automatically, this function is then not active in the <b>Options</b> → <b>Editor...</b> menu option.</p>
3	<p>Drag-and-drop the controller symbol onto the <b>Configuration</b> window.</p> <p><b>Result:</b> A dialog box with Modbus marking appears.</p> <p>The following figure shows the <b>Controller C1 (XPSMC16 Z)</b> dialog box:</p> 
4	<p>Select <b>OK</b>.</p> <p><b>Note:</b> By selecting the response time, you have a possibility to reduce the load of the CPU (not available for the XPSMC16X and XPSMC32X, where the response time is always ≤ 20 ms.) Note that when you change the response time in the current configuration, all configured timers are set to 0 and must be modified again. The limit ranges are then also changed.</p>

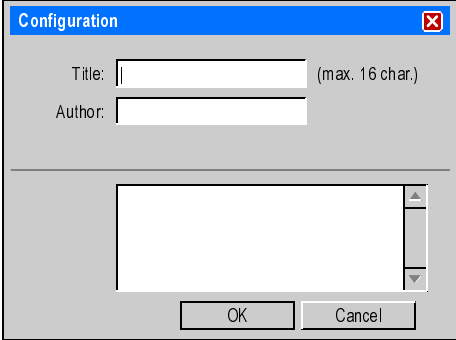
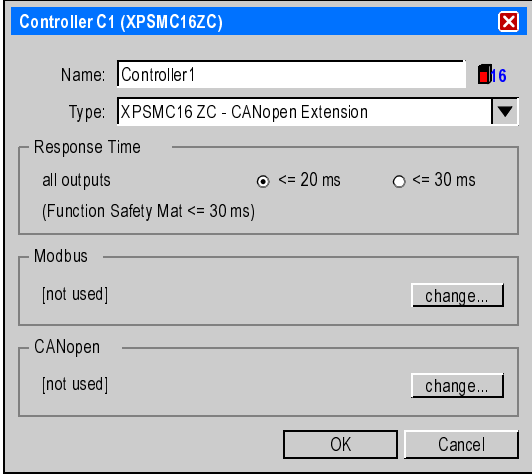
Step	Action
5	<p>To modify bus parameters click <b>change....</b></p> <p><b>Result:</b> The Modbus parameters dialog box appears.</p> <p>The following figure shows the <b>Modbus Parameters</b> dialog box:</p>  <p>This window also opens when all the other controllers in this configuration are added. Enter all necessary parameters.</p> <p><b>Note:</b> This window can also be accessed by clicking with the right mouse button on the controller symbol and then selecting the <b>Properties</b> option or <b>Controller</b> → <b>Controller Setup (Bus Configuration)</b> if the <b>Modbus</b> option is available.</p>
6	<p>Select the <b>Download</b> button.</p> <p><b>Result:</b> You will be asked to select the controller that your configuration corresponds to. Only the bus parameters for this controller will be transmitted.</p> <p><b>Note:</b> To download the whole configuration including the bus parameters, click <b>Controller</b> → <b>Download Configuration to Controller</b>.</p>

Step	Action
7	<p>After having closed the properties window of the controller, the controller will be represented in a tree structure.</p> <p>The following figure shows the <b>XPSMCWIN</b> application:</p> 

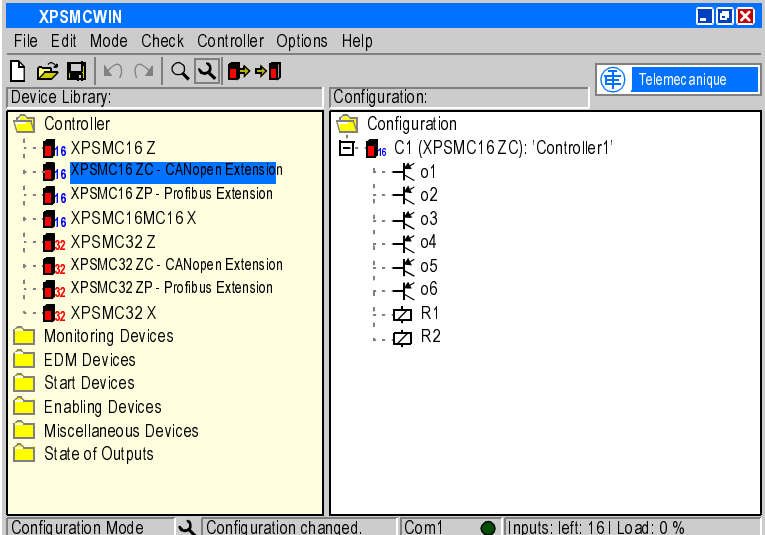


Procedure for  
CANopen

Proceed as follows:

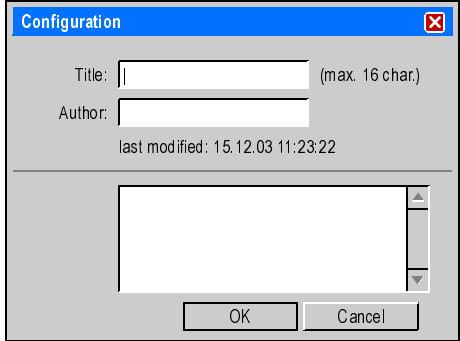
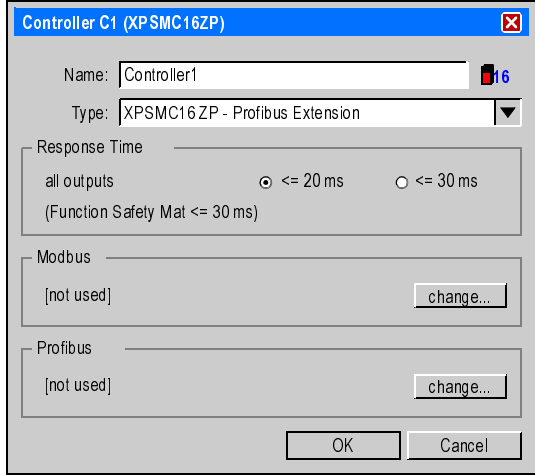
Step	Action
1	<p>To create a new configuration, click <b>File</b> → <b>New</b>.</p> <p><b>Result:</b> A window which contains the <b>Title</b> and the <b>Author</b> of this configuration opens.</p> <p>The following figure shows the <b>Configuration</b> dialog box:</p> 
2	<p>Fill out the fields and click <b>OK</b>.</p> <p><b>Note:</b> If this window does not open automatically, this function is not active in the <b>Options</b> → <b>Editor...</b> menu option.</p>
3	<p>Drag-and-drop the controller symbol onto the <b>Configuration</b> window.</p> <p><b>Result:</b> A dialog box with CANopen and Modbus markings appears.</p> <p>The following figure shows the <b>Controller C1 (XPSMC16Z)</b> dialog box:</p> 

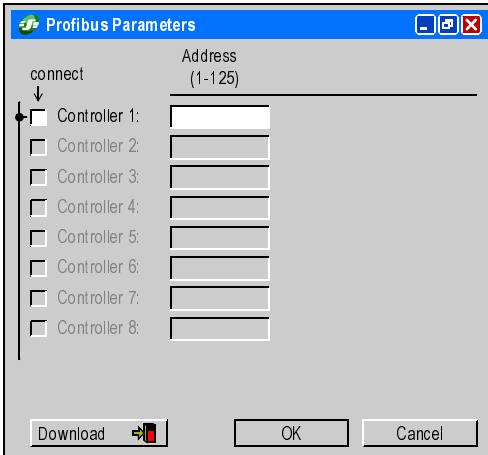
Step	Action
4	<p>Select <b>OK</b>.</p> <p><b>Note:</b> By selecting the response time, you have a possibility to reduce the load of the CPU (not available for the XPSMC16X and XPSMC32X, where the response time is always <math>\leq 20</math> ms.) Note that when you change the response time in the current configuration, all configured timers are set to 0 and must be modified again. The limit ranges are then also changed.</p>
5	<p>To modify bus parameters, click <b>change...</b> under <b>CANopen</b>.</p> <p><b>Result:</b> The <b>CANopen</b> parameters dialog box appears.</p> <p>The following figure shows the <b>CANopen Parameters</b> dialog box:</p> <div data-bbox="498 472 993 924"></div> <p>This window also opens when all the other controllers in this configuration are added. Enter all necessary parameters.</p> <p><b>Note:</b> This window can also be accessed by clicking the controller symbol with the right mouse button and then selecting the <b>Properties</b> option or <b>Controller</b> → <b>Controller Setup (BusConfiguration)</b> if the <b>CANopen</b> option is available.</p>
6	<p>Select the <b>Download</b> button.</p> <p><b>Result:</b> If you have more than one controller in the configuration, you will be asked to select the controller that your configuration corresponds to. Only the bus parameters for this controller will be transmitted.</p> <p><b>Note:</b> To download the entire configuration including the bus parameters, click <b>Controller</b> → <b>Download Configuration to Controller</b>.</p>

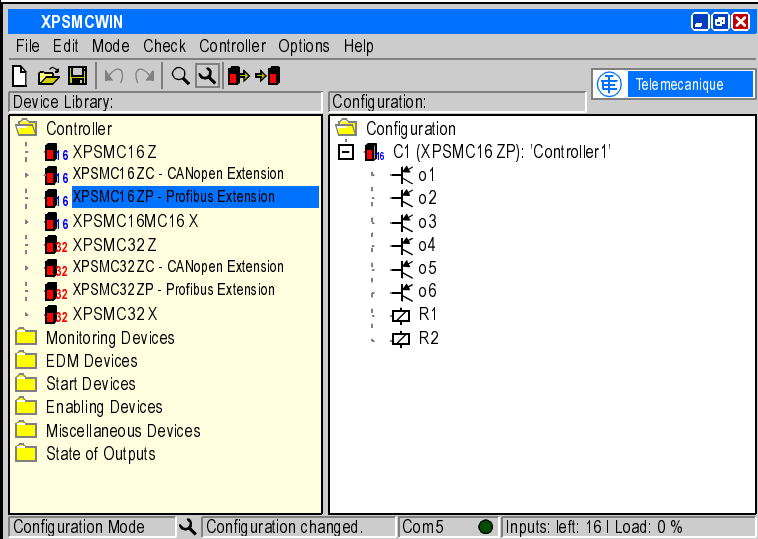
Step	Action
7	<div><p>After the <b>Properties</b> window of the controller has been closed, the controller will be represented in a tree structure.</p><p>The following figure shows the <b>XPSMCWIN</b> application:</p></div>

## Procedure for Profibus

Proceed as follows:

Step	Action
1	<p>To create a new configuration, click <b>File</b> → <b>New</b>.</p> <p><b>Result:</b> A window which contains the <b>Title</b> and the <b>Author</b> of this configuration opens.</p> <p>The following figure shows the <b>Configuration</b> dialog box:</p> 
2	<p>Fill out the fields and click <b>OK</b>.</p> <p><b>Note:</b> If this window does not open automatically, this function is then not active in the <b>Options</b> → <b>Editor...</b> menu option.</p>
3	<p>Drag-and-drop the controller symbol onto the <b>Configuration</b> window.</p> <p><b>Result:</b> A dialog box with Profibus and Modbus marking appears.</p> <p>The following figure shows the <b>Controller</b> dialog box:</p> 

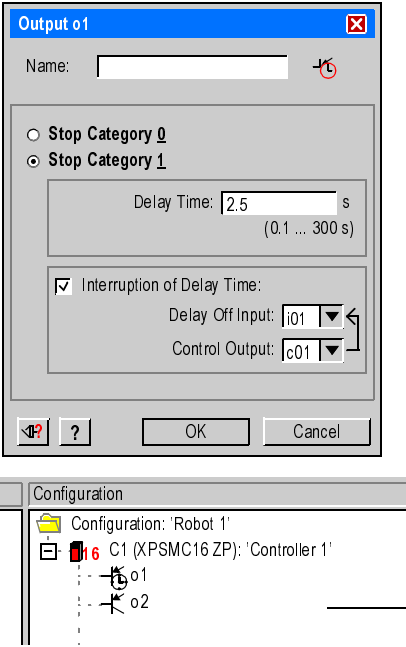
Step	Action
4	<p>Select <b>OK</b>.</p> <p><b>Note:</b> By selecting the response time, you have a possibility to reduce the load of the CPU (not available for the XPSMC16X and XPSMC32X, where the response time is always <math>\leq 20</math> ms.) Note that when you change the response time in the current configuration, all configured timers are set to 0 and must be modified again. The limit ranges are then also changed.</p>
5	<p>To modify bus parameters click <b>change..</b> under the Profibus marking.</p> <p><b>Result:</b> The Profibus parameters dialog box appears.</p> <p>The following figure shows the <b>Profibus Parameters</b> dialog box:</p>  <p>This window also opens when all the other controllers in this configuration are added.</p> <p><b>Note:</b> This window can also be accessed by clicking with the right mouse button on the controller symbol and then selecting the <b>Properties</b> option or <b>Controller</b> → <b>Controller setup</b>, where <b>Profibus</b> option is available.</p>
6	<p>Click the <b>Download</b> button.</p> <p><b>Result:</b> If you have more than 1 controller in the configuration, you will be asked to select the controller that your configuration corresponds to. Only the bus parameters will be transmitted.</p> <p><b>Note:</b> To download the entire configuration including the bus parameters, click <b>Controller</b> → <b>Download Configuration to Controller</b>.</p>

Step	Action
7	<p>After having closed the properties window of the controller, the controller will be represented in a tree structure.</p> <p>The following figure shows the <b>XPSMCWIN</b> application:</p> 

## Setting the Safety Outputs

**Introduction** The following information shows you how to set the safety outputs.

**Procedure** Set the safety outputs as follows:

Step	Action
1	<p>Click the right mouse button, and select <b>Properties</b>. The following dialog box appears:</p>  <p>The 'Output o1' dialog box shows the following settings:</p> <ul style="list-style-type: none"><li>Name: (empty field)</li><li>Stop Category 0 (unselected)</li><li>Stop Category 1 (selected)</li><li>Delay Time: 2.5 s (range 0.1 ... 300 s)</li><li>Interruption of Delay Time: <input checked="" type="checkbox"/> (checked)</li><li>Delay Off Input: i01</li><li>Control Output: c01</li></ul> <p>Below the dialog box, the configuration tree shows:</p> <ul style="list-style-type: none"><li>Configuration: 'Robot 1'</li><li>C1 (XPSMC16 ZP): 'Controller 1'</li><li>o1 (Output with delay time)</li><li>o2 (Output without delay time)</li></ul>
2	Set the properties of the output.
3	Confirm your settings by clicking <b>OK</b> .

**Dialog Settings**

The parameter setting window provides the following setting possibilities:

Option	Description
Name	A specific <b>Name</b> can be assigned to the output.
Stop Category 0/1	A choice can be made between <b>Stop Category</b> (stop not delayed) and <b>Stop Category 1</b> (stop delayed).
Delay Time	<b>Delay Time</b> is defined between 0.1 s and 300 s for the <b>Response Time</b> of 20 ms and between 0.15 s and 300 s for the <b>Response Time</b> of 30 ms for <b>Stop Category 1</b>
Interruption of Delays Time	An interrupt input can also be defined for an interruption of the delay. If the connection between the assigned control output and the safety input is opened, the safety output is immediately deactivated.
Icon for Block Diagram	A window opens in which the block diagram of the concerned component is represented.
Icon for Help (?)	The instruction sheet will be opened at the corresponding chapter of the component from which help is required.

These functions are available for all devices where the block diagram and help icons appear.

---



## Connecting a Device to a Safety Output

### Procedure

To assign a device to the desired safety outputs proceed as follows:

Step	Action
1	Open one of the device folder.
2	Click the symbol of the device you wish to connect, and drag it to the appropriate safety output symbol in the <b>Configuration</b> window. <b>Result:</b> When the mouse button is released, the device is connected to the safety output, as represented in a tree structure.

**Note:** The connection of several devices to a safety output is automatically a logical **AND**.

This procedure is the same for all the functionalities of the XPSMC.

### **WARNING**

#### **LOSS OF SAFETY INPUT CROSS-CONNECTION DETECTION**

Ensure that no more than one critical safety input is connected to each of the control outputs.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Modifying the Properties

---

### Introduction

By dropping a component onto an output, the properties window of this component will be automatically opened. This function can be activated or deactivated in the menu **Options** → **Editor....**

---

### Procedure

For additional modifications of the properties proceed as follows:

Step	Action
1	<p>Right-click and select <b>Properties...</b> in the shortcut menu.</p> <p><b>Result:</b> In this window, the adjustable parameters of this function can be modified.</p> <p><b>Note:</b> If this window does not open automatically, this function is not active in the <b>Options</b> → <b>Editor...</b> menu option. In this case, open the window by clicking the symbol with the right mouse button and selecting the <b>Properties...</b> menu option.</p>
2	<p>Indicate the switching item of this function (for example, the <b>Emergency Stop</b> button, the <b>Limit Switch</b>, etc.), the control outputs and the safety inputs with which it is connected to the XPSMC.</p> <p><b>Note:</b> If a control output c1...c8 has been used, a * follows the name, for example c2*, appears when this output is already in use.</p> <p>The user must guarantee that no dangerous fault can occur when this control output is used more than once, as a dangerous short-circuit, for example, is no longer detected.</p> <p><b>Note:</b> If a safety input is occupied, it no longer appears in the list of safety inputs currently available. An incorrect double occupation is therefore eliminated.</p> <p><b>Note:</b> The already used control outputs cannot be used in the <b>Properties</b> window of the device <i>Safety mats</i>.</p>
3	<p>Confirm the defined inputs with <b>OK</b>.</p>

---

<b>Note:</b> This procedure is the same for all the functionalities of the XPSMC.
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## 4.2 Monitoring Devices

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### At a Glance

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#### Overview

This section contains the description of the folder *Monitoring Devices*.

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#### What's in this Section?

This section contains the following topics:

Topic	Page
Overview of all Control Devices	52
Emergency Stop	54
Safety Guards	55
Light Curtains (Electro Sensitive Protective Equipment (ESPE)) of Category 4 without Muting	58
Light Curtain with Muting	60
Magnetic Switch	65
Two-Hand Control	66
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Zero Speed Detection	69
Injection Molding Machine	76
Hydraulic Press Valve Monitoring	78
Hydraulic Press 2	80
Eccentric Press	84
Eccentric Press 2	88
Shaft/Chain Break Monitoring	94
Seat Valve Monitoring	95

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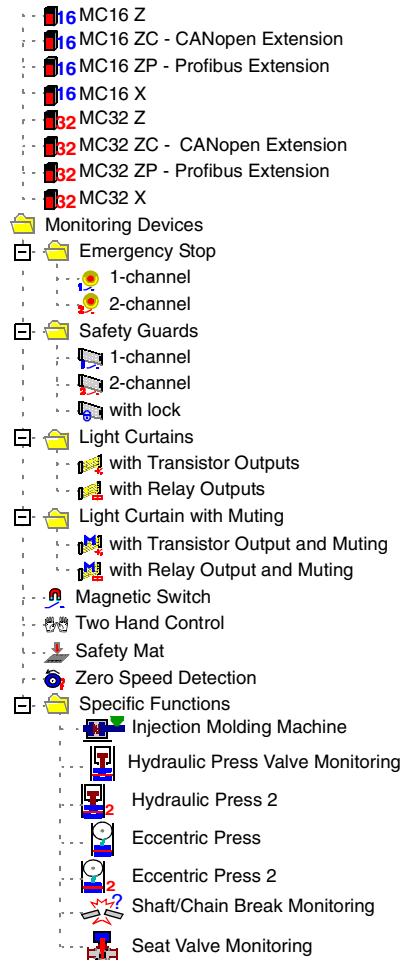
## Overview of all Control Devices

### Introduction

This information is about the *Monitoring Devices* folder. It contains all the control devices of the XPSMC.

The response time in the following pictures have the basis of 20 ms. When you use the basis of 30 ms the ranges are changing a little bit. See also *Response Time*, p. 34.

The figure below gives an overview of Monitoring Devices:



Monitoring Devices (continued):

- EDM Devices
  - EDM
- Start Devices
  - Automatic Start
  - Non-Monitored Start
  - Monitored Start
- Enabling Devices
  - Enabling Device 2-channel
  - Enabling Device 3-channel
- Miscellaneous Devices
  - Timer
  - OR
  - Foot Switch Control
  - Selector Switch
  - Closed Tool
- State of Outputs
  - 'Controller1'
    - o1
    - o2
    - o3
    - o4
    - o5
    - o6
    - R1
    - R2

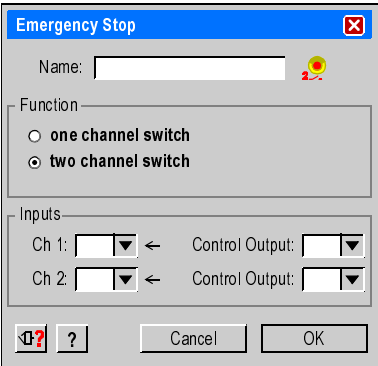
# Emergency Stop

## Introduction

The *Emergency Stop* folder contains the two device symbols for the one channel and two-channel emergency stop.

## Dialog Box Settings

You can make the following settings in the **Emergency Stop** dialog box:



The table describes the following setting possibilities:

Option	Description
Name	A specific <b>Name</b> can be assigned to this device.
Function	You can choose between a <b>one channel switch</b> and a <b>two channel switch</b> . The device symbol in the configuration tree is adapted automatically.
Inputs	The control outputs and the safety inputs with which the emergency stop button is connected to the XPSMC must be indicated in the <b>Inputs</b> group box.

## Safety Guards

---

### Introduction

**Note:** One of the 3 starting devices: automatic starting, non monitored starting or monitored starting must be assigned to each safety guard device. The corresponding safety output cannot be activated without this assignment.

The **Safety Guards** folder contains 3 device symbols: protection door with **1-channel** , protection door with **2-channels** and protection door with **lock** (3 channels).

---

Dialog Box  
Settings

The **Safety Guard** dialog box allows you to make the following settings:

The table describes the settings you can make setting possibilities:

Option	Description
Name	A specific <b>Name</b> can be assigned to the device.
Function	A choice can be made between a protection barrier with 1 limit switch <b>one channel, w/o lock</b> , 2 limit switches <b>two channel, w/o lock</b> or 2 limit switches with lock <b>two channel, with lock</b> . The device symbol is adapted to the choice made.
Safety Guard with 1 channel, w/o lock	In the <b>Options</b> field, you can define whether a <b>Start Interlock</b> is to be carried out. During the <b>Start Interlock</b> , the protection door must be opened once before the machine is started and then closed again, to guarantee that the connected contact ch.1 also operates. In the <b>Inputs</b> group box, the control output and the safety input to which ch.1 is connected must be indicated.



Option	Description
Safety Guard with 2 Channel, w/o Lock	<p>In the <b>Options</b> field, you can define whether a start interlock is to be carried out. During the start interlock, the protection door must be opened once before the machine is started and then closed again, to guarantee that the connected contacts ch.1 and ch.2 also operate. A synchronization time, during which contacts ch.1 and ch.2 must close, can also be entered. If this time is exceeded, the assigned safety outputs are not activated. For the response time of 20 ms, the range is 0.5...2.5 s; for the response time of 30 ms, the range is 0.45...2.4 s (synchronization time).</p> <p>The control outputs and the safety inputs used must be indicated in the <b>Inputs</b> group box.</p>
Safety Guard with 2 Channels, with Lock	<p>In the <b>Options</b> field, you can define whether a start interlock is to be carried out. During the start interlock, the protection door must be opened once before the machine is started and then closed again, to guarantee that the connected contacts ch.1, ch.2 and lock also operate. A synchronization time, during which contacts ch.1 and ch.2 must close, can also be entered. If this time is exceeded, the assigned safety outputs are not activated. For the response time of 20 ms, the range is 0.5...2.5 s; for the response time of 30 ms, the range is 0.45...2.4 s (synchronization time).</p> <p>The control outputs and the safety inputs used must be indicated in the <b>Inputs</b> group box.</p>

## Light Curtains (Electro Sensitive Protective Equipment (ESPE)) of Category 4 without Muting

---

### Introduction

The *Light Curtains* folder contains two device symbols:

Light curtain (ESPE = Electro Sensitive Protective Equipment) **with Transistor Outputs** and **with Relay Outputs** with and without muting.

**Note:** One of the three starting devices: automatic starting, non monitored starting or monitored starting must be assigned to each light curtain device. The corresponding safety output cannot be activated without this assignment.

For the light curtain with transistor outputs, the light curtain checks its safety outputs itself (OSSD = Output Safety Switching Device) by a short interruption. The light curtain safety outputs must be connected to different XPSMC safety inputs.

This output test is not, however, possible for the output and is thus performed by the XPSMC. To guarantee complete short-circuit monitoring, the light curtain safety outputs must be connected to different XPSMC safety inputs and control outputs.

For the light curtain safety outputs the following synchronization time must be entered:

Response Time	Synchronization Time
20 ms	0.5...2.5 s
30 ms	0.45...2.4 s

If the time difference between the tripping of the two safety outputs (OSSD) is greater, the safety outputs affected are not activated.


---

Dialog Box  
Settings

The parameter setting window provides the following setting possibilities:

Light Curtain

Name: Light Curtain



Function

☐ Transistor Output

☒ Relay Output

Options

☐ Start Interlock



Sync Time

Sync Time OSSD 1 - OSSD 2: 0.5 s  
(0.5 ... 2.5 s)

Inputs

OSSD 1:  ← Control Output:

OSSD 2:  ← Control Output:

OK

Cancel

The table describes the following setting possibilities:

Option	Description
Name	A specific <b>Name</b> can be assigned to the device.
Function	A choice can be made between the light curtain with a <b>Transistor Output</b> and <b>Relay Output</b> . The device symbol is adapted to the choice made.
Options	You can define whether a <b>Start Interlock</b> is to be carried out. During the start interlock, the light curtain protection field must be interrupted once and validated again, before activating the XPSMC safety outputs. A synchronization time during which contacts ch.1 and ch.2 must close can also be entered. If this time period is exceeded, the assigned safety outputs are not activated. The response time period of 20 ms can be defined in the range between 0.5 s and 2.5 s, and a response time of 30 ms - in the range of 0.45...2.4 s (for the synchronization time).
Inputs	The <b>Control Outputs</b> (by outputs alone) and the safety inputs to which the light curtain safety outputs ( <b>OSSD 1</b> and <b>OSSD 2</b> ) are connected are activated.

## Light Curtain with Muting

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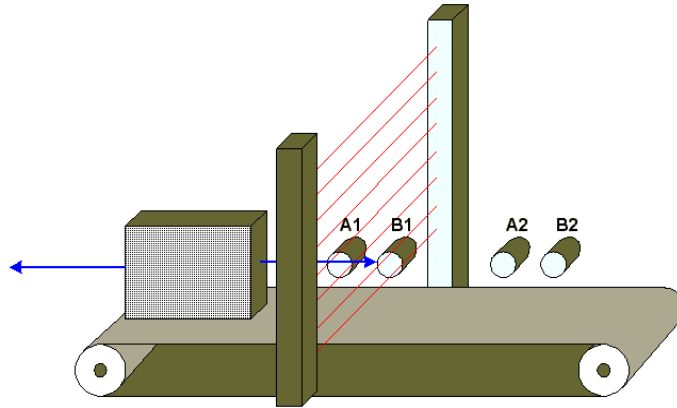
### Introduction

The *Light Curtain with Muting* folder contains two device symbols:

Light curtain (ESPE = Electro Sensitive Protective Equipment) with transistor outputs or relay outputs, and with muting function.

The muting function can be used to bypass the protection field of a light curtain (ESPE) in order, for example, to bring a part to be worked into and/or leave the hazardous area.

Show a muting example:



The muting function is controlled by four additional sensors belonging to two groups (A and B), and can only be activated when the safety outputs have already been activated (the protection field is then free). If not, the activation of the muting function produces an error message and the safety outputs remain deactivated. Muting operates according to a suitable order of the muting sensors in both directions of transport, and thus inside and outside the hazardous area again.

The muting sensors of groups A and B must be activated during a variable synchronization time **tsyn** (0.5...3 s with the response time of 20 ms or 0.6...3 s with a response time of 30 ms or to infinity), in order to trigger the muting function. A muting time **tM** can also be adjusted from 0.5...10 min or to infinity. During this time, the conveyed goods can pass through the activated protection field, without the XPSMC safety outputs switching off the machine. If this time is exceeded, an error message appears and the safety outputs are deactivated.

The override button is used to bypass the protection field manually. This is necessary, for example, when the muting function is activated and when conveyed goods have entered and stuck in the light curtain protection field (ESPE). Through this option, the goods can be withdrawn from the machine, in spite of the light curtain (ESPE). To prevent inappropriate use, the override function can only be activated for up to 10 min.

## **WARNING**

### **IMPROPER ACCESS TO A PROTECTED AREA**

Ensure opening sizes are as small as possible and comply with EN60294.  
Ensure photo-sensors are clean and free from obstructions.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## **WARNING**

### **DETECTOR INTERFERENCE HAZARD WITH THRU-BEAM SENSORS**

Reciprocal mount transmitters and receivers.  
Mount adjacent receivers at distance greater than minimum separation distance.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

To create the muting signal, sensors with relays output, or mechanical limit switches are suitable for making sure that a distinction is made between individuals and goods. At the same time, all easy defeating must be prevented (stickers or photoelectric sensors for example).

On entering the hazardous area, light signal is recommended to announce the muting status for muting operation; this signal must be connected between terminal H1 and the XPSMC supply voltage (terminal A1). If a fault occurs at the level of this light signal (short-circuit, interruption), the muting function is immediately deactivated and an error message appears. The safety outputs are then deactivated.

Sources of white light with an illumination surface of 1 cm<sup>2</sup> and a brightness of at least 200 lm/m are used as a light signal. The current of this light source could vary from 20...350 mA.

The light signal always comes on when the muting signals are generated correctly and announces the bypassing of the light curtain protection function (ESPE):

- A new cycle is only initiated with the starting control when no muting signal is required and when the protection field is free.
- During the time a muting signal is produced correctly, no one must be allowed to enter the hazardous area.

- A guideless means of transport must create the muting signal before it enters the protection field, and may only leave this field when it no longer interrupts the light curtains beams of the protection field.

The muting function meets the requirements of category 4 according to EN 954-1. To ensure the correct monitoring of the muting lamp, a minimum duration of 500 ms for muting is necessary.

Photoelectric muting sensors must operate in dark switching mode, in order to produce the output signal when a light ray is interrupted.

---

Dialog Box  
Settings

The parameter setting window provides the following setting possibilities:

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Function	A choice can be made between the light curtain with a transistor or relay output. The device symbol is adapted to the choice made.
Options	You can define whether a start interlock is to be carried out. During the start interlock, the light curtain protection field must be interrupted once and validated again, before activating the XPSMC safety outputs.
Inputs	Both the <b>Control Outputs</b> (by relay outputs only) and the safety inputs to which the light curtain safety relay outputs ( <b>OSSD 1</b> and <b>OSSD 2</b> ) are connected are activated.

Press the **Muting** button you get the following **Muting Parameters** window.

The **Muting Parameters** window offers the following options:

Muting Parameters

Options

☐ Muting Time Monitoring

Muting Time:  min  
(0.5 ... 10 min)

☐ Sync Time Monitoring A1-B1/A2-B2:

Sync Time:  s  
(0.5 ... 3.0 s)

Inputs

A 1:

B 1:

A 2:

B 2:

Override:

Control Output:

Control Output:

Control Output:

The following table describes the parameters of the dialog box:

Option	Description
Options	<p><b>Muting Time Monitoring:</b> The optional <b>Muting Time</b> indicates the maximum time the muting function is allowed to operate. Exceeding this time with the muting function still activated causes an error message. The <b>Muting Time</b> have the range of 0.5...10 min.</p> <p><b>Override Time:</b> The <b>Override Time</b> indicates the maximum time during which the relieve time function can be activated. The default value set is 10 min. The <b>Override Time</b> has the range of 0.5...10 min</p> <p><b>Synchronization Time Monitoring:</b> The optional <b>Sync Time</b> is the time during which the muting sensors of groups A and B must be activated before muting is started. If this time is exceeded, the muting function is not activated. For a response time of 20 ms, the range is 0.5...2.5 s, and for a response time of 30 ms, the range is 0.45...2.4 s for the <b>Sync Time</b>.</p>
Inputs	<p>The override input, the 2 groups A and B of muting sensors and the control outputs to which the XPSMC are connected to the light curtain, must be indicated in the <b>Inputs</b> group box.</p> <p>The 2 groups A and B of muting sensors must be necessarily connected to different control outputs.</p>



# Magnetic Switch

## Introduction

The *Monitoring Devices* folder contains the *Magnetic Switch* control device symbol. The Magnetic Switch consists of an opening contact and a closing contact, which must be actuated within the Synchronization Time, otherwise the Safety Outputs affected are not activated.

## Dialog Box Settings

The parameter setting window offers the following settings:

The table describes the following setting possibilities:

Option	Description
Name	A specific <b>Name</b> can be assigned to this device.
Options	You can define whether a <b>Start Interlock</b> is to be carried out. During the <b>Start Interlock</b> , the magnetic switch must be actuated once before the machine is started and then de-activated again to guarantee that the connected contacts are also operating. For the response time of 20 ms, the range is 0.5...2.5 ms, and for the response time of 30 ms, the range is 0.45...2.4 s for the Synchronization Time.
Inputs	The control outputs and the safety inputs must be indicated in the <b>Inputs</b> group box.

## Two-Hand Control

### Introduction

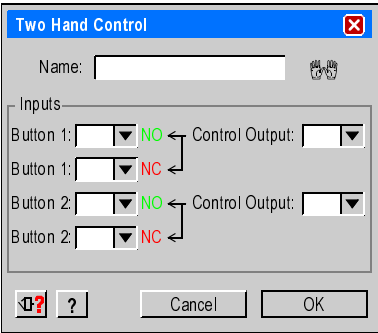
The *Monitoring Devices* folder contains the *Two-Hand Control* device symbol.

The control panel of the two-hand control consists of two buttons each having an opening contact and a closing contact. These buttons must be actuated within the synchronization time space of 0.5 s, to obtain switching of the safety outputs. If this time is exceeded, the assigned safety outputs are not activated.

To ensure complete short-circuit monitoring, the 2 buttons must be connected to different control outputs. If a button produces an unexpected signal, such as a short-circuit for example, the safety outputs affected are deactivated or are not activated and an error message appears.

### Dialog Box Settings

The parameter setting window provides the following setting possibilities:



The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Inputs	The control outputs and the safety inputs to which the two-hand control buttons are connected, must be indicated in the <b>Inputs</b> field.

## Safety Mat

### Introduction

**Note:** 1 of the 3 starting devices: automatic starting, non monitored starting or monitored starting must be assigned to each switching mat function. The corresponding safety output cannot be activated without this assignment.

The *Monitoring Devices* folder contains the *Safety Mat* function symbol.

The switching mat consists of two pairs of metal leads that are short-circuited when the mat is walked on. The XPSMC safety outputs are then immediately deactivated. To be able to detect this short-circuit, the four connection leads must be connected to different safety inputs and control outputs.

**Types:** see Technical Specifications, Hardware Manual.

**Note:** The control outputs used for this device cannot be used for any other device!

### WARNING

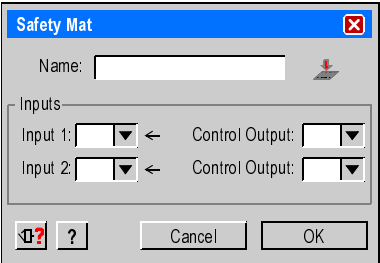
#### LOSS OF SAFETY INPUT-CROSS CONNECTION DETECTION

In Safety Mat applications, ensure that all four connection leads are connected to different safety inputs and control outputs.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

**Dialog Box  
Settings**

The parameter setting window provides the following setting possibilities:



The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Inputs	The control outputs and the safety inputs to which the safety switching mat is connected must be indicated in the <b>Inputs</b> group box.

---

## Zero Speed Detection

---

### Introduction

The *Monitoring Devices* folder contains the symbol *Zero Speed Detection* device symbol.

This device detects the zero speed of a motor or a shaft. To enter the motor rotational speed, an encoder wheel and two PNP sensors are required as indicated in figure *Functional Diagram, p. 200*. These sensors can only be connected to XPSMC safety inputs i1 and i2. If these inputs are already taken, a warning appears automatically.

### Points to be Complied

The following points should be complied with for this device:

- The sensors must be arranged so that only 1 sensor is activated at any given time (= HIGH-Signal).
- If both sensors are in the LOW state, a cable break error message is indicated and the corresponding outputs are deactivated.
- If both sensors are in the HIGH state after power on of the XPSMC, a notification is send via Modbus and the corresponding outputs are deactivated. After a zero speed detection and a subsequent motion the notification is reset.
- If zero speed is already detected and both sensors are in HIGH state, a notification is send via Modbus and the corresponding outputs are activated.
- If only 1 sensor produces a dynamic signal after a zero speed, an error message appears after 30 s and the corresponding outputs are deactivated.
- If, after the XPSMC has started, both sensors are in the LOW state, an error message appears.

**Note:** You cannot use the Zero Speed Detection device simultaneously with the Shift/Chain Break Monitoring device on the XPSMC safety controller, because there are only two counter inputs (i1 and i2) per controller.

**Note:** The output will be activated if the sensors detect no motion.

---

**Sensor States and Behavior**

Switch-on Sequence

State of Sensor 1	0	0 (*)	1
State of Sensor 2	0	1 (*)	1
Behavior	Error Message	Zero Speed	Notification (**)
Output	0	1	0

Operation

State of Sensor 1	0	0 (*)	1
State of Sensor 2	0	1 (*)	1
Behavior	Error Message	Zero Speed	Notification
Output	0	1	1

\* If the state of the sensors is inverse (0/1, 1/0), the behavior is identical.

\*\* If the firmware version is earlier than 2.34 an error message (short circuit between inputs) appears instead of a notification. This error message must be acknowledged with the reset button.

**Error Message** External error messages must be acknowledged with the reset button.

**Notification** A notification, sent via Modbus, does not need to be acknowledged. As soon as the sensor states change, it will be acknowledged automatically.

---

**Calculation**

Both sensors give a frequency depending on the numbers of cogs and the revolution per minute:

$$f[\text{Hz}] = \frac{n[\text{rpm}]}{60} \times z$$

or

$$n[\text{rpm}] = \frac{f[\text{Hz}] \times 60}{z}$$

where

f = Pulse frequency of the sensors in Hertz

n = Rotational speed of the encoder wheel in revolutions per minute

z = Encoder wheel number of cogs

## **WARNING**

### **IMPROPER OPERATON**

Do not use the XPSMC in applications where the pulse frequency requirement for detection of cogs on a rotary machine exceeds 450 Hz.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

**Examples**

**Example 1:** Machine with 3000 rpm and an encoder wheel with 26 cogs:

$$f_{\text{max}} = \frac{3000}{60} \times 26 = 1300\text{Hz}$$

1300 Hz is not authorized, because it is greater than 450 Hz.

**Example 2:** The same machine (3000 rpm) and an encoder wheel with 8 cogs:

$$f_{\text{max}} = \frac{3000}{60} \times 8 = 400\text{Hz}$$

400 Hz is authorized, because it is smaller than 450 Hz.

**Switching  
Frequency**

The frequency limit, below which the zero speed is detected and the safety outputs activated, can be adjusted by the user within a range of 0.05...20 Hz.

**Example:** A 8-cog encoder wheel is located above a shaft. A zero speed is detected when the speed is less than 10 rpm.

$$f_{\text{Switchingfrequency}} = \frac{10[\text{rpm}]}{60} \times 8 = 1.33\text{Hz}$$

A switching frequency of 1.33 Hz must be indicated to detect a zero speed.

**Note:** A frequency calculator is included in the properties determination menu. Enter the number of cogs and the zero speed limit in rpm, and the frequency limit to be set is calculated automatically.

The switching from **Motor Operation** to **Zero Speed** (= activation of safety outputs) only occurs when

1. 1 safety input contains a HIGH signal and
  2. the other input contains a LOW signal and
  3. the frequency on the two inputs is lower than the value entered.
-



**Dialog Box  
Settings**

The parameter setting window provides the following setting possibilities:

Zero Speed Detection

Name: Zero Speed Detection

Zero Speed Frequency: 1 Hz  
(0.05 ... 20 Hz)

Frequency Calculator: [Calculator Icon]

Inputs (fixed)

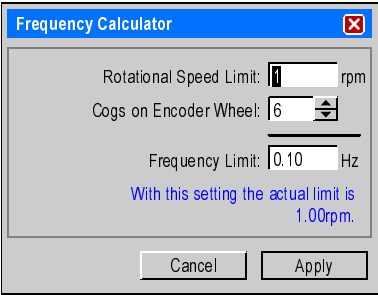
Sensor 1: i01 Sensor 2: i02

[Help] [?] [OK] [Cancel]

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Zero Speed Frequency	The frequency limit, below which the zero speed must be detected and the safety outputs activated, must be indicated in this field, as indicated above. For the response time of 20 ms, the range is 0.05...20 Hz, and for the response time of 30 ms, the range is 0.05...16.7 Hz for the Zero Speed Frequency.
Frequency Calculator	A dialogue field opens when you click here.
Inputs (Fixed)	i1 and i2

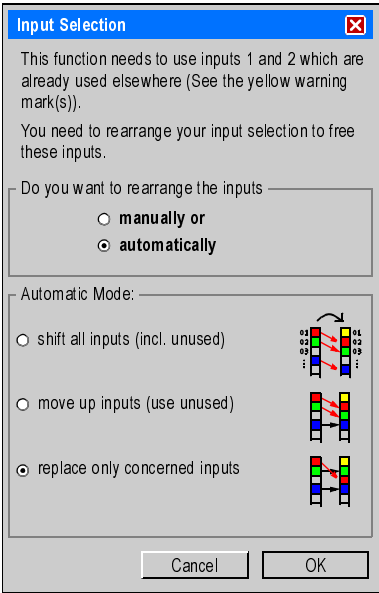
The parameter setting window provides the following setting possibilities:



The table describes the following setting possibilities:

Option	Description
Rotational Speed Limit	The desired rotational speed limit (in rpm) to detect a zero speed.
Cogs on Encoder Wheel	The number of cogs.
Frequency Limit	The frequency limit to be set is calculated automatically; it can be adjusted using the <b>Apply</b> button in the <b>Properties</b> menu.

Safety inputs i1 and i2 are already automatically indicated in the **Inputs** field. This device cannot operate with other inputs. If inputs i1 and/or i2 are already used, the following window appears to resolve the conflict:



The table describes the following setting possibilities:

Option	Description
Manually or	As a user, you assign other safety inputs manually to the function using i1 and/or i2. When <b>OK</b> is clicked, the <b>Properties</b> window of all concerned devices will be opened.
Automatically	<p>The software automatically assigns other safety inputs to the function using i1 and/or i2 according to 1 of 3 options:</p> <ol style="list-style-type: none"><li><b>1. shift all inputs</b> All the safety inputs are shifted as a block. Inputs that are not used and are available may also be shifted. For example, i1 becomes i3, i2 becomes i4 and i4 becomes i6.</li><li><b>2. move up inputs</b> All the safety inputs are shifted as a block. Inputs that are not used and are available may also be shifted, and spaces thus filled. For example, i1 becomes i3, i2 becomes i4 and i4 becomes i5.</li><li><b>3. replace only concerned inputs</b> Only the inputs that are used (i1 and/or i2) are shifted to the next free safety inputs. This is the standard option.</li></ol>

## Injection Molding Machine

---

### Introduction

**Note:** 1 of the 3 starting devices: automatic starting, non monitored starting or monitored starting must be assigned to each injection molding machine device. The corresponding safety output cannot be activated without this assignment.

The *Specific Functions* folder contains the *Injection Molding Machine* device symbol for monitoring an injection molding machine with a protection door, as indicated in figure *Wiring Diagram*, p. 206.

The 3 limit switches Ch.1, Ch.2 and Valve must then be connected to various control outputs and safety inputs, to ensure complete short-circuit monitoring. The injection molding machine is activated according to the switching states of limit switches Ch.1, Ch.2 and Valve, in accordance with the function diagram in figure *Functional Diagram*, p. 204. A **Start Interlock** is, in this case, mandatory, i.e. the protection door must be opened once and then closed again, to make starting possible.

---

Dialog Box  
Settings

The parameter setting window provides the following setting possibilities:

Injection Molding Machine

Name: Injection Molding Machine

Sync Time: s  
(0.5 ... 2.5 s)

Inputs

Ch.1: Control Output:

Ch.2: Control Output:

Valve: Control Output:

?

OK

Cancel

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Sync Time	A synchronization time, during which contacts ch.1 and ch.2 must close, must be entered in this field. If this time is exceeded, the assigned safety outputs are not activated. For the response time of 20 ms, the range is 0.5...2.5 s, and for the response time of 30 ms, the range is 0.45...2.4 s for the Synchronization Time.
Inputs	The safety inputs and control outputs used must be indicated in this field.

## Hydraulic Press Valve Monitoring

### Introduction

The *Specific Functions* folder contains the *Hydraulic Press Valve Monitoring* device symbol for monitoring a hydraulic press valve, as indicated in figure *Wiring Diagram*, p. 208.

Using this device, a hydraulic press with safety valves with three position switches or with PNP sensors Valve C to Valve C+O can be connected to the XPSMC, as shown in the figure *Wiring Diagram*, p. 208. The press control delivers the press opening and closing signals. Each time the leading edge of the two press control signals, `OPEN PRESS` and `CLOSE PRESS` goes positive, a configurable internal time window is generated, during which the XPSMC waits for a response from the appropriate valve position switch (Valve C and Valve C+O for press closing, Valve O for press opening). If this time window is exceeded, the corresponding safety outputs are deactivated.

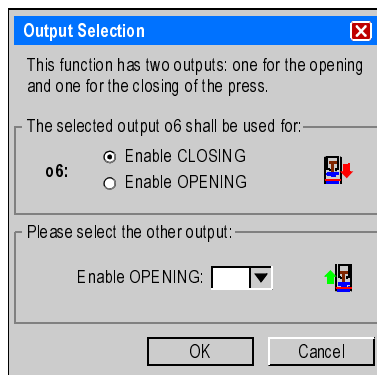
If signals Valve C to Valve C+O appear in an order other than the one shown in figure *Functional Diagram*, p. 207, the affected safety outputs of this function are then deactivated and an error message appears.

This function thus delivers the `CLOSING AUTHORIZATION` signal to a safety output, if the `CLOSE PRESS` signal is active and if Valve C and Valve C+O are closed correctly in the time window.

The `OPENING AUTHORIZATION` signal will also be activated on a safety output, if the `OPEN PRESS` signal is active and if Valve O is closed correctly in the time window.

When this device is selected, it is first necessary to assign the `OPENING AUTHORIZATION` function to a safety output and the `CLOSING AUTHORIZATION` function to another safety output.


This takes place in the window which appears automatically:



## Dialog Box Settings

The parameter setting window provides the following setting possibilities:

**Hydraulic Press**

Name:  

Options

Sync Time:  s  
(0.1 ... 1.5 s)

Inputs

Valve C:  ▼

Valve O:  ▼

Valve C-O:  ▼

Close:  ▼ ←



Open:  ▼ ←

Control Output:  ▼

☐ Enable bypassing of valve monitoring by:

Input:  ▼ ←

Control Output:  ▼

  OK Cancel

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Options	A synchronization time, during which the respective contacts Valve C/Valve C+O and Valve O/Valve C+O must close, can be entered in this field. If this time is exceeded, the corresponding safety outputs are deactivated. For the response time of 20 ms, the range is 0.1...1.5 s, and for the response time of 30 ms, the range is 0.15...1.5 s for the Synchronization Time.
Inputs	<p>The safety inputs and the control output used must be indicated here. Switches Valve C to Valve C+O must be connected directly to the +24 V supply voltage. The two contacts for <b>OPEN PRESS</b> and <b>CLOSE PRESS</b> can operate with the same control output.</p> <p>Optional, an input to bypass the monitoring of the valves can be chosen. If the bypass is used, Valve C, Valve O and Valve C+O will not be monitored and have no influence on the position of the press. The safety outputs are dependant only on the situation of the <b>OPEN</b> and <b>CLOSE</b> contacts.</p>

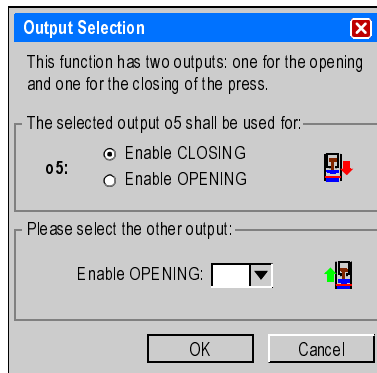
## Hydraulic Press 2

### Introduction

The *Specific Functions* folder contains the *Hydraulic Press 2 Functions* device symbol for a hydraulic press with valve monitoring and optional overtravel monitoring, as indicated on the *Wiring Diagram*, p. 208.

This device provides an internal mode selector switch function for the operation modes **OFF / INCHING / SINGLE STROKE / AUTOMATIC** of the hydraulic press. The use of the overtravel monitoring functionality is optional. The press control delivers the press opening and closing signal; the use of these inputs is mandatory when **Automatic** mode is selected. The use of the input for the **Open** command is also mandatory when mode **Inching** is selected. In **Inching** mode, valve monitoring is not active.

When you drag-and-drop the Hydraulic Press 2 device onto an output, the following window appears. Here you can select the output you need and enable either the opening or the closing movement of the machine.





The following image shows the output selection options:

Hydraulic Press 2

Name:

Inputs

Valve C: \*

Valve O: \*

Valve C + O: \*

☐ OTS:

☐ UT:

☐ Use Overtravel Monitoring

NWK:

Kx:

☒ Use Open/Close Signals from PLC

Close:

Open:

\* contact position of deactivated valve

Control Output

Control Output

Control Output

Control Output

Sync Time:  s

(0.1 ... 1.5 s)

Mode Selector Switch

0 - Off

1 - Inching:

2 - Single Stroke:

3 - Automatic:

used

☐

☒

☒

☒

?

?

OK

Cancel

33003281

81

**Dialog Box  
Settings**

The following table describes dialog settings of the Hydraulic Press 2:

Option	Description
Name	A specific name can be assigned to this device.
Options	Here you can enter synchronization time in which respective contacts Valve C / Valve C+O and Valve O / Valve C+O must be moved (opened or closed). If the time is exceeded, corresponding Safety Outputs are deactivated. For the response time of 20 ms, the range is 0.1...1.5 s; for the response time, the range is 0.15...1.5 s for the Synchronization Time.
Inputs	The safety inputs and the control output used must be indicated here. Switches Valve C to Valve C+O must be connected directly to +24 V supply voltage. NWK and Kx are an own control output. The close and opening contact use also only 1 control output.

Option	Description
Mode Selector Switch	<p>The following operation modes are available:</p> <ul style="list-style-type: none"> <li>● <b>Mode Off</b> The press is deactivated and all safety outputs connected to the press are turned off.</li> <li>● <b>Mode Inching</b> Position switches <b>OTS</b> and <b>UN</b> as well as the switches of the valves <b>PSV1</b> and <b>PSV2</b> will not be monitored, and have no influence on the movement of the press. The safety outputs are dependant only on the situation of the <b>Safety Means and Start</b>.</li> <li>● <b>Mode Single Stroke</b> With each releasing of the start device, for instance <b>Two-Hand Control</b>, one stroke of the press is implemented. The safety stopping at the top dead centre is realized by the limit switches <b>OTS</b> and <b>UN</b>. The automatic upstroke is controlled by the closing of the limit switch <b>UN</b>. In addition, with selected valve monitoring, the synchronous time of the two halves of the press safety valve (<b>PSV</b>) are monitored with the switches <b>PSV1</b> and <b>PSV2</b> when switching on and off.</li> <li>● <b>Mode Continuous</b> The functions of monitoring correspond in theory to those of the mode <b>Single Stroke</b>, however the press does not stop after one cycle. The continued operation starts with the input <b>Safety Means and Start</b>, and the press runs until the <b>Safety Means and Start</b> input is released or the <b>Continuous Off</b> switch is switched off. Dynamic monitoring of the valve and the monitoring of overtravel will only be performed one time in the continuous cycle.</li> <li>● <b>Mode Continuous Automatic</b> The function of monitoring corresponds to those of the mode <b>Single Stroke</b>, however the press does not stop after one cycle. Continued operation starts with the input <b>Safety Means and Start</b> (after the start, the device can be deactivated), and the press runs until the <b>Continuous Off</b> switch is actuated or the <b>Safety Means for Continuous Automatic</b> input is switched off. Dynamic monitoring of the valve and monitoring of overtravel will only be performed one time in the continuous cycle.</li> </ul>

**Note:** In the following situations, reoperate all safety means:

- The E-Stop has been pressed.
- The operation mode has been changed.
- The opening has been finished in single stroke or inching.
- Safety means for presses that are not to be operated each stroke should be dragged and dropped onto the press output and not on the press itself.

## Eccentric Press

### Introduction

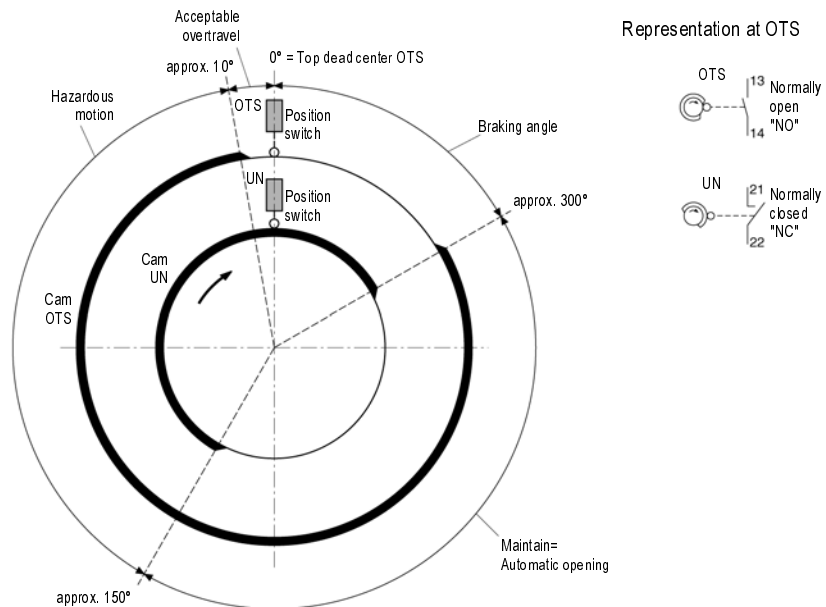
The *Specific Functions* folder contains the *Eccentric Press* symbol to control the safety stopping of an eccentric press at top dead center (OTS) with over-travel monitoring and optional valve monitoring.

The press must be operated with a two-hand control device. The XPSMC safety outputs are activated as long as the start signal is active at the beginning of the cycle and the position switches OTS, UN, PSV1, and PSV2 deliver the correct signals throughout the cycle. To enable short-circuit detection, the position switches must be connected to different safety inputs and control outputs.

The function detailed operation differs according to the selected operating method.

Position switches OTS and UN detect the press movement and in particular safety stopping at the top of the dead center OTS.

The control cams are shown on the following functional diagram:



Position switches PSV1 and PSV2 monitor the status of the press safety valve. For the response time of 20 ms, the range is 0.1...1.5 s, and for the response time of 30 ms, the range is 0.15...1.5 s for the **Synchronization Time**. If this time is exceeded, an error message appears, and the corresponding safety outputs are deactivated until the **Reset** input is activated.

To delete an overtravel error or an error at the **UN** or **OTS** position switches, the **Reset** input must be actuated. The errors on the press safety valves, the **UN** or **OTS** position switches, and overtravel will not be cleared by switching off the controller.

If one of the safety inputs delivers an incorrect signal, an error message appears, and the corresponding safety outputs are deactivated.

---

Dialog Box  
Settings

The parameter settings window provides the following setting possibilities:

Eccentric Press

Name: Eccentric Press

Options

☒ Valve Monitoring

Sync Time PSV1-PSV2 (s): (0.1 ... 1.5 s)

Inputs

OTS: UN: PSV1: PSV2: Continous Off: Reset:

Control Output: Control Output: Control Output: Control Output:

Mode Selector Switch:

Off: Inching: Single Stroke: Continuous Autom.:

?

Cancel

OK

Description of the settings window:

Setting	Description
Name	A specific <b>Name</b> can be assigned to the device.
Options	The valve monitoring can be activated, and the <b>Synchronization Time</b> for the switch <b>ON</b> and <b>Off</b> of the press safety valves PSV1 and PSV2 can be adjusted. For the response time of 20 ms, the range is 0.1...1.5 s, and for the response time of 30 ms, the range is 0.15...1.5 s for the <b>Synchronization Time</b> .
Inputs	Relation between inputs and control outputs can be selected.

Setting	Description
Mode Selector Switch	<p>The following operation modes are available:</p> <ul style="list-style-type: none"> <li>● <b>Mode Off</b> The press is deactivated and all safety outputs connected to the press are turned off.</li> <li>● <b>Mode Inching</b> Position switches <b>OTS</b> and <b>UN</b> as well as the switches of the valves <b>PSV1</b> and <b>PSV2</b> will not be monitored, and have no influence on the movement of the press. The safety outputs are dependant only on the situation of the <b>Safety Means and Start</b>.</li> <li>● <b>Mode Single Stroke</b> With each releasing of the start device, for instance <b>Two-Hand Control</b>, one stroke of the press is implemented. The safety stopping at the top dead centre is realized by the limit switches <b>OTS</b> and <b>UN</b>. The automatic upstroke is controlled by the closing of the limit switch <b>UN</b>. In addition, with selected valve monitoring, the synchronous time of the two halves of the press safety valve (<b>PSV</b>) are monitored with the switches <b>PSV1</b> and <b>PSV2</b> when switching on and off.</li> <li>● <b>Mode Continuous</b> The functions of monitoring correspond in theory to those of the mode <b>Single Stroke</b>, however the press does not stop after one cycle. The continued operation starts with the input <b>Safety Means and Start</b>, and the press runs until the <b>Safety Means and Start</b> input is released or the <b>Continuous Off</b> switch is switched off. Dynamic monitoring of the valve and the monitoring of overtravel will only be performed one time in the continuous cycle.</li> <li>● <b>Mode Continuous Automatic</b> The function of monitoring corresponds to those of the mode <b>Single Stroke</b>, however the press does not stop after one cycle. Continued operation starts with the input <b>Safety Means and Start</b> (after the start, the device can be deactivated), and the press runs until the <b>Continuous Off</b> switch is actuated or the <b>Safety Means for Continuous Automatic</b> input is switched off. Dynamic monitoring of the valve and monitoring of overtravel will only be performed one time in the continuous cycle.</li> </ul>

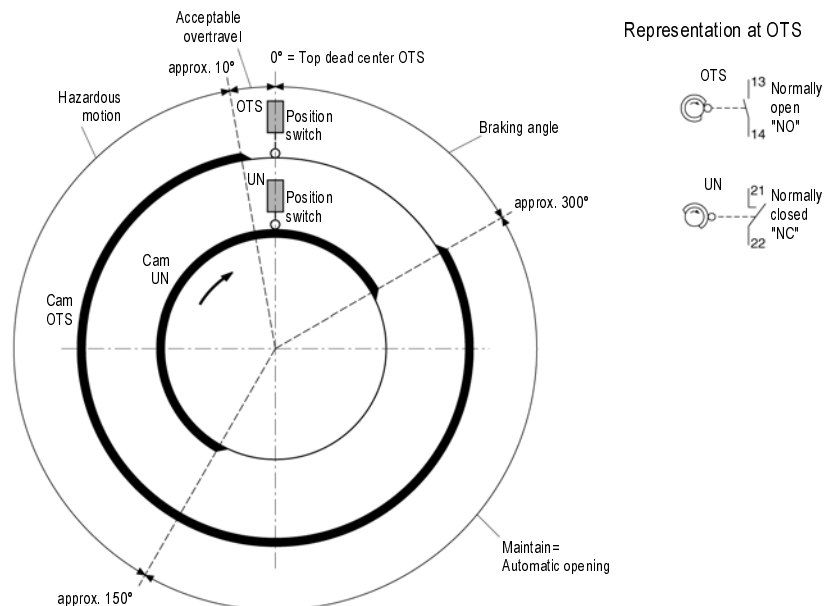
## Eccentric Press 2

### Introduction

The *Specific Functions* folder contains the *Eccentric Press 2* device symbol to control the safety stopping of an eccentric press at top dead center (OTS) with over-travel monitoring and optional valve monitoring. The valve monitoring shown in the *Wiring Diagram*, p. 218 is optional. The press must be operated with the minimum of 1 device, such as **Light Curtains without Muting**, **Safety Guard**, **Magnetic Switch**, **Two-Hand Control**, **Foot Switch**, and **Selector Switch**.

The XPSMC safety outputs are activated as described for the different operation modes and the position switches OTS, UN, PSV1 and PSV2 deliver correct signals throughout the cycle. To enable short-circuit detection, the position switches must be connected to different safety inputs and control outputs. The function-specific operations differ according to the selected operation mode. Position switches OTS and UN detect the press movement and ensure safety stopping at the top dead center OTS.

The control cams are shown on the following functional diagram:





Two more switches PSV1 and PSV2 monitor the status of the press safety valve. For the response time of 20 ms, the range is 0.1...1.5 s, and for the response time of 30 ms, the range is 0.15...1.5 s for the **Synchronization Time**. If this time is exceeded, an error message appears, and corresponding safety outputs are deactivated until the reset input is activated.

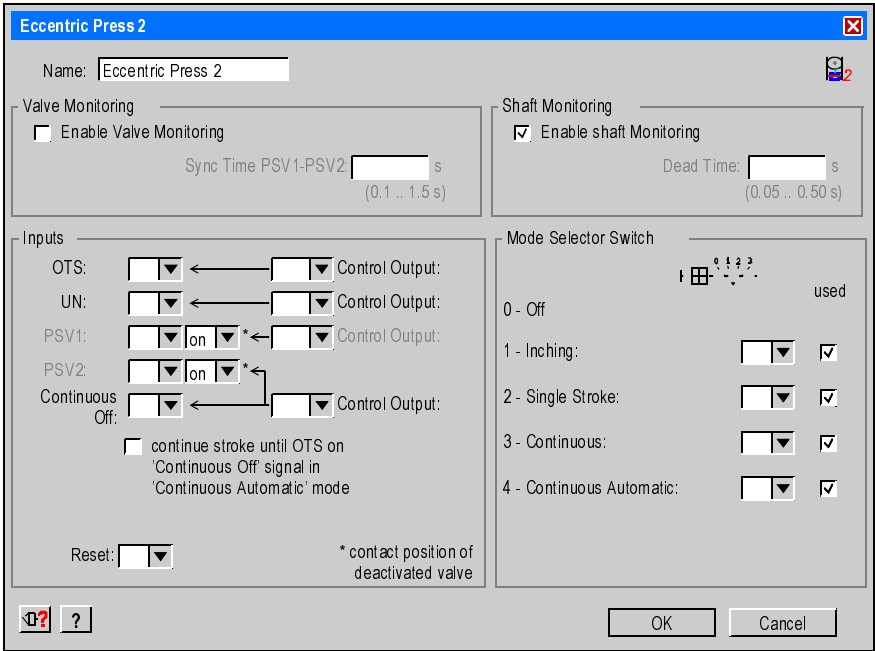
To delete an overtravel error or an error at the UN or OTS position switches, the reset input has to be actuated. The errors on the press safety valves, the UN or OTS position switches and overtravel will not be cleared by switching off the controller.

If one of the safety inputs delivers an incorrect signal, an error message appears and the corresponding safety outputs are deactivated.

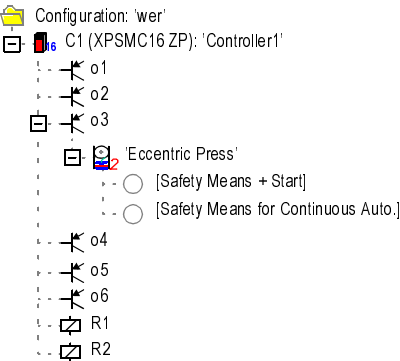
---

Dialog Box  
Settings

The parameter setting window provides the following setting possibilities:



The following image shows the safety means displayed on the output tree:



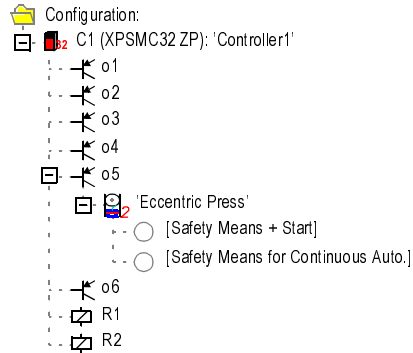
The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Valve Monitoring	For the response time of 20 ms, the range is 0.1...1.5 s, and for the response time of 30 ms, the range is 0.15...1.5 s for the <b>Synchronization Time</b> .

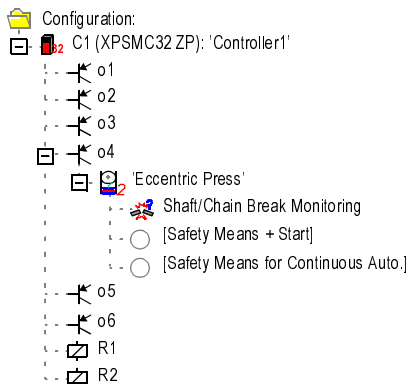
Option	Description
Shaft Monitoring	For the response time of 20 ms, the range is 0.05...0.50 s, and for the response time of 30 ms, the range is 0.06...0.48 s for the <b>Synchronization Time</b> .
Inputs	The used inputs and the control output must be indicated in this field (see the <i>Wiring Diagram</i> , p. 206. The stopping functionality of the <b>Continuous Off</b> signal can be defined. The <b>Reset Switch</b> and <b>Mode Selector Switch</b> must be connected directly to the +24 V supply voltage.
Mode Selector Switch	<p>The following operation modes are available:</p> <ul style="list-style-type: none"> <li>● <b>Mode Off</b> The press is deactivated and all safety outputs connected to the press are turned off.</li> <li>● <b>Mode Inching</b> Position switches <b>OTS</b> and <b>UN</b> as well as the switches of the valves <b>PSV1</b> and <b>PSV2</b> will not be monitored, and have no influence on the movement of the press. The safety outputs are dependant only on the situation of the <b>Safety Means and Start</b>.</li> <li>● <b>Mode Single Stroke</b> With each releasing of the start device, for instance <b>Two-Hand Control</b>, one stroke of the press is implemented. The safety stopping at the top dead centre is realized by the limit switches <b>OTS</b> and <b>UN</b>. The automatic upstroke is controlled by the closing of the limit switch <b>UN</b>. In addition, with selected valve monitoring, the synchronous time of the two halves of the press safety valve (<b>PSV</b>) are monitored with the switches <b>PSV1</b> and <b>PSV2</b> when switching on and off.</li> <li>● <b>Mode Continuous</b> The functions of monitoring correspond in theory to those of the mode <b>Single Stroke</b>, however the press does not stop after one cycle. The continued operation starts with the input <b>Safety Means and Start</b>, and the press runs until the <b>Safety Means and Start</b> input is released or the <b>Continuous Off</b> switch is switched off. Dynamic monitoring of the valve and the monitoring of overtravel will only be performed one time in the continuous cycle.</li> <li>● <b>Mode Continuous Automatic</b> The function of monitoring corresponds to those of the mode <b>Single Stroke</b>, however the press does not stop after one cycle. Continued operation starts with the input <b>Safety Means and Start</b> (after the start, the device can be deactivated), and the press runs until the <b>Continuous Off</b> switch is actuated or the <b>Safety Means for Continuous Automatic</b> input is switched off. Dynamic monitoring of the valve and monitoring of overtravel will only be performed one time in the continuous cycle.</li> </ul>

Depending on whether **Enable Shaft Monitoring** is selected or not, the corresponding device will or will not appear in the **Configuration** window immediately under **Eccentric Press**.

#### Without shaft monitoring

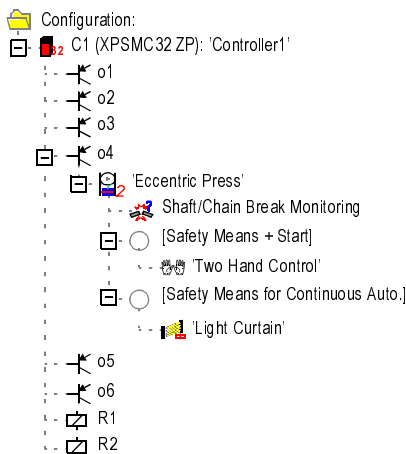


#### With shaft monitoring



When devices have been moved to the safety means, the safety means to be started in the **Continuous Automatic** mode appear underneath the corresponding small circles, as shown in the example below.

## Two-hand control and a light curtain



**Note:** The *Selector Switch* device can be used to provide the signals for *Safety Means and Start* and/or ***Safety Means and Continuous Automatic*** to the press device. The ***Selector Switch*** devices permit a great deal of flexibility regarding various safety means for the different operation modes (see *Selector Switch*, p. 109).

Safety means for presses that are not to be operated each stroke should be dragged and dropped onto the press output and not on the press itself.

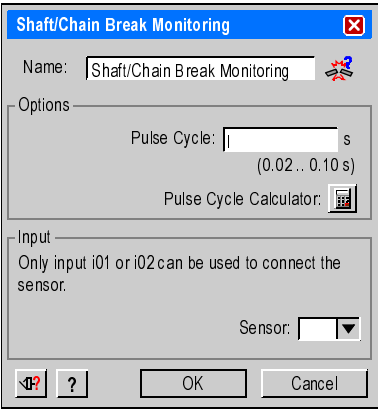
# Shaft/Chain Break Monitoring

## Introduction

The *Specific Functions* folder contains the *Shaft/Chain Break Monitoring* icon. The device is used to monitor the movement of a cam switch mechanism of an eccentric press, as shown in the *Shaft/Chain-Break Monitoring*, p. 229. This device is directly linked to the OTS and UN position switches by a cogwheel sensor and can only be connected either to input i1 or i2. You can drag and drop the device from the library onto any output of the controller. For the *Eccentric Press 2* device, you can only enable the *Shaft Monitoring* device inside the *Properties* window.

## Dialog Box Settings

The parameter setting window provides the following possibilities:



The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Options	For the response time of 20 ms, the range is 0.02...0.10 s, and for the response time of 30 ms, the range is 0.03...0.9 s for the <b>Pulse</b> cycle.
Inputs	Only i01 or i02 are selectable.

**Note:** You can only use 2 different Shaft/Chain Break Monitoring devices in 1 XPSMC, because there are only 2 counter inputs (i1 and i2) available, see also *Zero Speed Detection*, p. 69.

# Seat Valve Monitoring

## Introduction

The *Specific Functions* folder contains the device symbol for monitoring of a seat valve as shown in figure *Wiring Diagram, p. 232*.

The device senses the start signal for operating the valve with the first input and the answer signal of the concerned valve contact with the second input.

## Dialog Box Settings

The parameter setting window provides the following setting possibilities:

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Options	The function of the valve contact can be selected as either NO or NC. For the response time of 20 ms, the range is 0.1...3.0 s, and for the response time of 30 ms, the range is 0.15...3.0 s for the <b>Synchronization Time</b> .
Inputs	After the start signal is given and the valve contact is not operating, the output of the device is immediately activated and remains activated until the synchronisation time is exceeded. The output only remains activated if the valve contact is operating during the synchronisation time. After this, the valve contact may open and close without disrupting the output as long as the start signal is maintained. If the start command disappears, the output will always be deactivated.





# 4.3 EDM Devices

## EDM Device (External Device Monitoring)

### Introduction

The *EDM Device* folder contains the device symbol for monitoring a feedback loop. This device is used to monitor external devices such as subsequent contactors or relays.

If, for example, external contactors K1 / K2 are activated, the EDM input to which opening contacts K1 and K2 are assigned must then be opened, by the end of the adjustable synchronization time at the latest. If this is not the case, an error message appears and the safety outputs concerning K1 and K2 are deactivated.

Before activating the safety output, ensure that the EDM input is activated. If it is not, an error message appears, and the safety output gets deactivated.

### Dialog Box Settings

The parameter setting window provides the following setting possibilities:

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Options	<p>A synchronization time, during which the return circuit must open, can be entered in this field. If this time is exceeded, the corresponding safety output is deactivated. For the response time of 20 ms, the range is 0.1...0.5 s, and or the response time of 30 ms, the range is 0.15...0.5 s for the <b>Synchronization Time</b>.</p> <p>If the <b>Synchronization Time</b> is not activated, only check whether the EDM input is closed immediately before activating the safety outputs.</p>
Inputs	The safety input and the control output must be indicated in this field.

# 4.4 Start Device

## Start Device

### Introduction

The *Start Devices* folder contains 3 device symbols for

- Automatic Start,
- Non-Monitored Start,
- Monitored Start.

The functional diagram for these devices is shown, as an example, in figure *Functional Diagram, p. 174*.

### Dialog Box Settings

The parameter setting window provides the following setting possibilities:

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.

Option	Description
Function	<p>You can then select one of the starting devices again in this field. The device symbol in the configuration tree is adapted automatically.</p> <p>The following options are available:</p> <ul style="list-style-type: none"><li>● <b>Automatic Start</b> The safety outputs are activated as soon as all the starting conditions are fulfilled. A start button is not necessary.</li><li>● <b>Non monitored Start</b> The safety outputs are activated as soon as all the starting conditions are fulfilled and starting is initiated by the start button being pressed. The <b>Start</b> button must not re-activated to launch the <b>Start</b> device, and the non monitored start then operates in the same way as the automatic start.</li><li>● <b>Monitored Start</b> In this case, the safety outputs are only activated when all the starting conditions are fulfilled and starting is initiated when the start button is pressed (automatic start on a positive trigger edge) or when the start button is pressed and released (automatic start on a negative trigger edge). It is possible to define whether starting should take place on the positive-going edge or negative-going edge of the starting signal. Unlike non monitored starting, the safety output cannot be activated when the start button is actuated by an XPSMC Power-Up or when the start button is maintains status 1 for some time after the operation. This will cause an error message.</li></ul>
Options	<p>During monitored starting, a selection can be made in this field between automatic start on a positive trigger edge (= starting when the start button is pressed) or automatic start on a negative trigger edge (= starting when the start button is released).</p>
Inputs	<p>The safety input and the control output must be indicated here.</p>

## 4.5 Enabling Devices

---

### Two-Channel or Three-Channel Enabling Device

---

#### Introduction

The *Enabling Devices* folder contains 2 device symbols for the enabling switch. This device can be used alone on a safety output, with a safety guard or together with a safety guard on the OR device.

**Note:** The enabling device can be dragged and dropped together with a safety guard onto the OR device. An external switch (preferably a key switch) should be used to enable the input of the enabling device.

With an enabling switch, a safety guard can be bypassed and a hazardous movement can consequently be started, even with a protection door open, during the fitting out of a machine for example. The enabling switch does not activate the dangerous movement but gives a validation for the dangerous movement to be actuated.

This function works with a two or three channel enabling switch (*Wiring Diagram*, p. 234 or figure *Wiring Diagram*, p. 236). Category 4 is only achieved when using the 3 position enabling switch. For the types of enabling switches that can be used, see the *Technical Data* chapter of the Hardware instruction manual.

To produce the confirmation signal, the enabling switch must first be set to position 0 and then to position 1. The authorization is thus activated, as are the XPSMC safety outputs. If the enabling switch reaches position 2, the safety outputs are again deactivated. When the enabling switch is set back to position 0, no further enabling is authorized, even if the switch is returned to position 1.

---

Dialog Box  
Settings

The parameter setting window provides the following setting possibilities:

Enabling Device

Name:

Enabling Device

Function

☐ two channels

☒ Three channels

Options

☐ Enable Time Monitoring:

Enable Time:  min

(0.5 ... 10 min)

Inputs

Ch 1:

NO

← Control Output:

Ch 2:

NC

← Control Output:

Ch 3:

NO

← Control Output:

OK

Cancel

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Function	You can select one of the enabling switches in this field. The device symbol in the configuration tree is adapted automatically. The switching diagram needed for the contact switch is also schematically illustrated here.
Options	Here a max. enable time can be given. If the enabling switch is active longer than the enable time, the corresponding safety outputs will be deactivated and a fault message will be given. The time is adjustable from 0.5...10 min.
Inputs	The safety inputs and control outputs used must be indicated in this field. To ensure reliable short-circuit detection, all the contacts must be set into service on different control outputs.



# 4.6                    Miscellaneous Devices

## At a Glance

**Overview**                    This section contains the description of the *Miscellaneous Devices* folder, which contains all the logic devices.

**What's in this Section?**                    This section contains the following topics:

Topic	Page
Timer	104
OR Device	106
Foot Switch Control Device	107
Selector Switch	109
Closed Tool Device	112

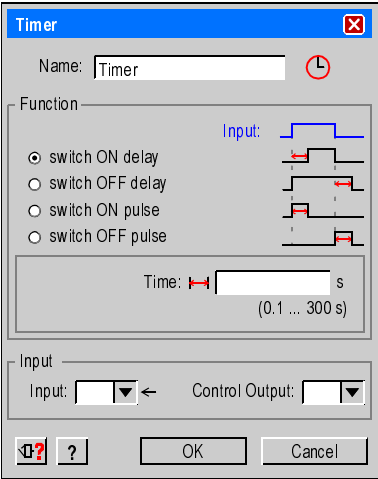
# Timer

## Introduction

The *Miscellaneous Devices* folder contains the *Timer* device symbol. Figure *Functional Diagram*, p. 226 indicates the corresponding functional diagrams. This device enables the safety output(s) with the timer function.

## Dialog Box Settings

The parameter setting window provides the following setting possibilities:



The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.



Option	Description
Function	<p>You can select one of the four operating modes:</p> <ol style="list-style-type: none"> <li><b>1. Switch ON delay</b> If the safety input changes its status from 0 to 1 and stays at 1, the adjustable time delay starts, and the time delay has reached its setpoint, the safety output is set to 1. If the control output is set to 0, the safety output is simultaneously set to 0. If the safety input status changes to 0, and the time delay has not expired, the safety output remains at 0.</li> <li><b>2. Switch OFF delay</b> If the safety input changes its status from 0 to 1, the safety output is immediately set to 1. If the safety input changes its status from 1 to 0 and stays at 0, the adjustable time delay starts, and the time delay has reached its setpoint, then the safety output is set to 0. If the safety input status changes to 1, and the time delay has not reached its setpoint, the safety output remains at 1.</li> <li><b>3. Switch ON pulse</b> If the safety input changes its status from 0 to 1 and stays at 1, the adjustable time delay starts, and the safety output is simultaneously set to 1. The safety output is set to 0, if the time delay has reached its setpoint, or the safety input changes to 0.</li> <li><b>4. Switch OFF pulse</b> If the safety input changes its status from 1 to 0, then the adjustable time delay starts, and the safety output is set to 1. The safety output is set to 0, if the time delay has reached its setpoint.</li> </ol> <p>The function is presented by an explanatory schematic diagram.</p>
Time	For a response time of 20 ms the range is 0.1 to 300 s and for a response time of 30 ms the range is 0.15...300 s.
Inputs	The safety input and the control output used for the control signal must be indicated here.

## OR Device

---

### Introduction

The *Miscellaneous Devices* folder contains the symbol of the *OR Device*.

The result of an OR connection between several devices is validation of an output.

There are no properties available for this device.

The OR component cannot be used with an E-Stop device.

---

## Foot Switch Control Device

### Introduction

The *Miscellaneous Devices* folder contains the *Foot Switch Control* device symbol. The device monitors a NO and NC contact from 1 control output.

### Dialog Box Settings

The parameter setting window provides the following setting possibilities:

The table describes the following setting possibilities:

Option	Description
Name	A specific <b>Name</b> can be assigned to this device.
Options	<ul style="list-style-type: none"><li>● <b>Start Interlock:</b> Foot switch must be released before starting the foot switch function.</li><li>● <b>Sync Time Monitoring:</b> for the response time of 20 ms, the range is 0.5...2.5 s, and for the response time of 30 ms, the range is 0.45...2.4 s for the Synchronization Time, required for the 2 inputs, NO and NC.</li></ul>
Inputs	The <b>Inputs</b> must be supplied from a control output.

## DANGER

### HAZARDOUS APPLICATIONS

Do not use foot switches on machines without point-of-operation protection.

**Failure to follow these instructions will result in death or serious injury.**

**Note:** The use of the Foot Switch requires additional safety measures! The Foot switch does not provide technical safety for a press control. Example: In order to control the continuous mode of a press with the Foot Switch, additional safety means are necessary (e.g., Safety Guard, Light Curtain).

---

---

## Selector Switch

---

### Introduction

The *Miscellaneous Devices* folder contains the *Selector Switch* device symbol.

You can drag the selector switch device symbol to either the Eccentric Press 2, the Hydraulic Press 2, or directly to an output.

The selector switch device helps you to select the devices to be used as safety means and start means. When you drag and drop the selector switch symbol onto an output or a press, no dialog box will appear, because you should first drag and drop all relevant devices onto the switch and configure them, before you define your selection.

The following is a list of devices that can be dragged and dropped onto the *Selector Switch* device (their number is limited by the number of inputs of the controller).

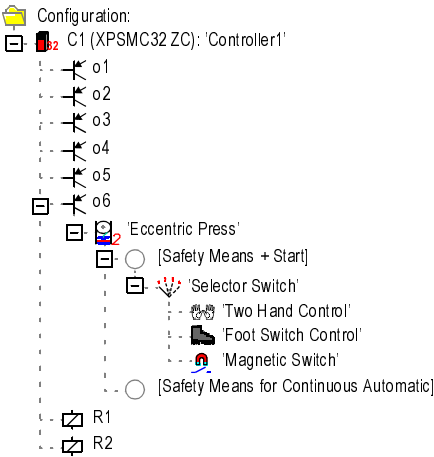
For the Hydraulic Press 2 and Eccentric Press 2 (Safety Means + Start / Safety Means for Continuous Automatic):

- Safety Guards
- Light Curtains without Muting
- Magnetic Switches
- Two-Hand Control
- Foot Switch
- Enabling Device
- Closed Tool device

For an output:

- Safety Guards
- Light Curtains
- Magnetic Switches
- Two-Hand Control
- Foot Switch Control
- Safety Mat
- Zero Speed Detection
- Hydraulic Press
- Eccentric Press
- Shaft / Chain Break Monitoring
- Seat Valve Monitoring
- Start devices
- Enabling devices
- Timer

The following image shows the selector switch on a safety means and start of the Eccentric Press 2 with three related devices:



**Dialog Box  
Settings**

The following image shows the selector switch with related devices. Here you can allocate the devices to the relevant input.

The parameter setting window provides the following setting possibilities:

Selector Switch

Name: Selector Switch

Device Declaration

Selector Switch Position:

used:

Input:

1

2

3

4

5

6

☒

☒

☒

☐

☐

☐

i01

i02

i03

☒

☐

☐

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Two Hand Control:

Foot Switch Control:

Magnetic Switch:

OK

Cancel

The table describes the following setting possibilities:

Option	Description
Name	A specific name can be assigned to this device.
Device Declaration	Selector Switch position: Select the relevant input to the selector switch position.

For the safety means and start it is active in

- Position 1: Two-Hand Control
- Position 2: Magnetic Switch
- Position 3: Foot Switch Control and Magnetic Switch

## Closed Tool Device

---

### Introduction

The *Miscellaneous Devices* folder contains the *Closed Tool* symbol. You can use this device with a *Selector Switch* and an additional start device (e.g., *Foot Switch Control*) on *Hydraulic Press 2* or *Eccentric Press 2*. You can also move it directly to the safety means for continuous automatic operation of the *Eccentric Press 2*.

When you configure the *Closed Tool* device directly to the *Safety Means* for continuous automatic operation of the *Eccentric Press 2*, you also need an external key switch to enable the continuous automatic operation as well as a signal lamp.

---



## 4.7 State of Outputs

### Applying Output States to Other Safety Outputs

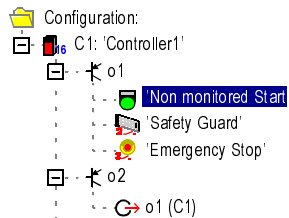
#### Introduction

The *Output states* folder contains the symbol of the safety outputs for each controller.

By moving the output  $x$  symbol on the output  $y$  in the **Configuration** window, the safety output  $y$  will have the same behavior as the safety output  $x$ . Other components can be assigned to the output  $y$ .

The same result will be achieved by moving the output  $x$  symbol with the left mouse button onto the output  $y$ .

#### Example



In this example, safety output  $o1$  is associated with **Non monitored Start**, **Safety Guard** and two channel **Emergency Stop**. Safety output  $o2$  represents the 2nd channel of this safety function and will behave exactly like  $o1$ .

No adjustment is provided for in this function. Modifications can only be performed in the original safety function (in this case, safety output  $o1$ ); they are then taken into account automatically in the corresponding safety output.



---

# Configuration

5

---

## At a Glance

### Overview

This chapter contains the description to create a configuration.

### What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
5.1	General Information	117
5.2	Application Scheme Configuration	119
5.3	Configuring the Emergency Stop Function	131
5.4	Save the Configuration	137
5.5	Requesting/Changing the Password	139
5.6	Sending a Configuration from the PC to the XPSMC and Performing a Check	141
5.7	Loading a Configuration	149
5.8	Creation/Transfer of a Validated Configuration Copy	151
5.9	Read Protocol from Controller	155



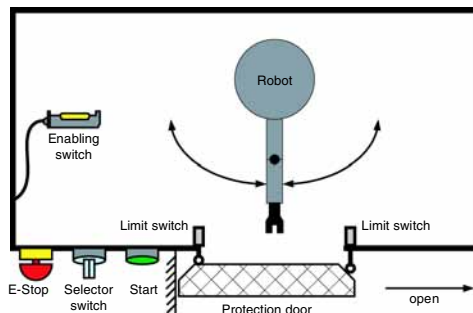
## 5.1 General Information

### Generals

#### Introduction

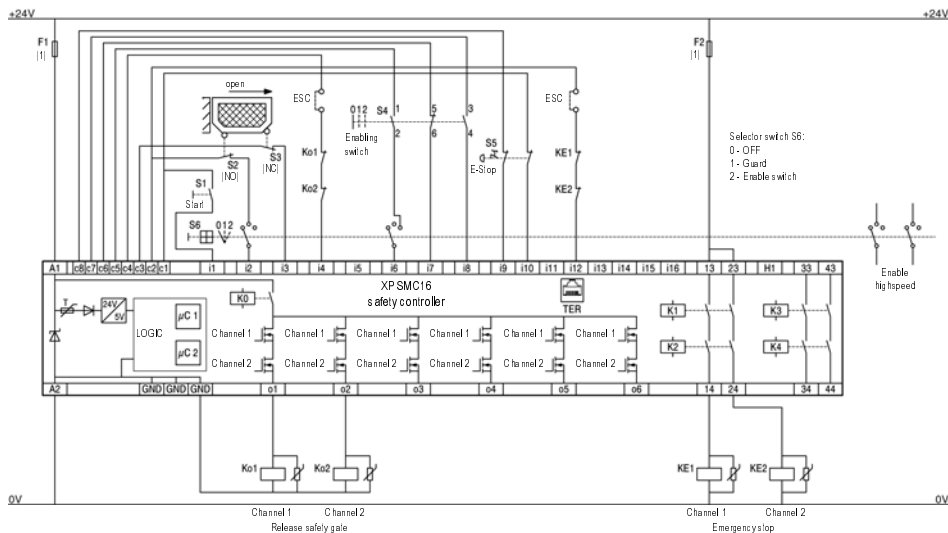
**Note:** The configuration can be created with the PC offline, i.e. without being connected with an XPSMC, and later sent to the XPSMC.

By way of example, the creation of a configuration is explained by means of the following application:



The entry of personnel into the hazardous zone of the robot arm is prevented by the guard/protection door with 2 limit switches. For adjustment and maintenance purposes, the robot arm may also be controlled when the door is open by using an enabling switch. The choice of using the guard or enabling switch for personnel safety is done by an external selector switch mounted near the guard. The safety of any personnel inside or around this cell is further enhanced with a two-channel emergency stop.

The corresponding wiring diagram could be as follows:



**ESC External Start Conditions**

(1) See Technical Data for maximum fuse size, Hardware manual

**Note:** XPSMC32 with 32 inputs i1...i32, otherwise identical

Enable switch contact:



A complete overview of all the functions and their configurations is given in chapter *Wiring (Examples) and Functional Diagrams, p. 163*.

**Maximum Response Time**

You can select the response time for all XPSMC••Z versions. For the XPSMC••X versions, the response time is always  $\leq 20$  ms. By selecting the response time, you can reduce the load of the CPU. Note that when you change the response time in a current configuration, all configurable timers are set to zero and must be modified again. The limit ranges for the timers is also changed.

---

## 5.2 Application Scheme Configuration

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### At a Glance

---

**Overview** This section contains the application scheme of configuration.

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**What's in this Section?** This section contains the following topics:

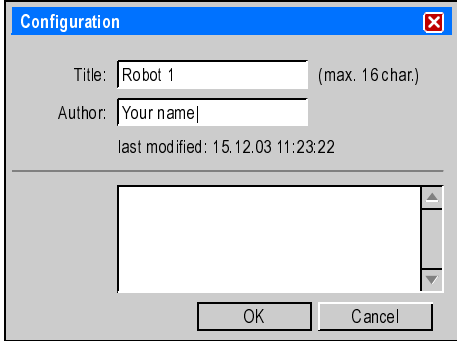
Topic	Page
Creating a New Configuration / Selecting a Controller Type	120
Assigning the Switch Position	124
Assigning the Protective Guard Function	125
Assigning the Starting Function	126
Assigning the Enabling Device	127
EDM Adjustment	128
Assign a Name and a Stop Category to a Safety Output	129
Copying the State of One Safety Output onto another Safety Output	130

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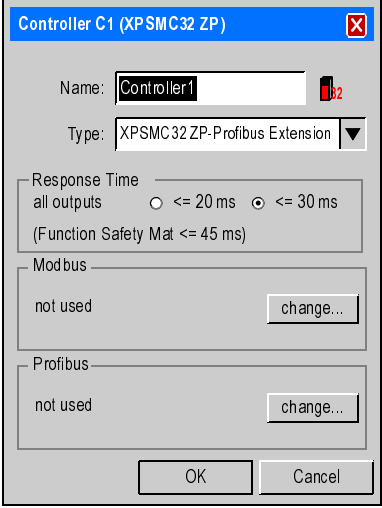
## Creating a New Configuration / Selecting a Controller Type

**Procedure**

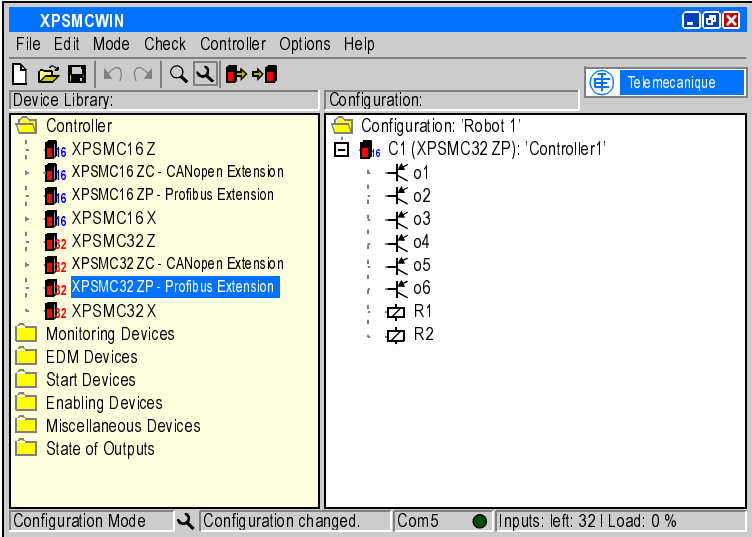
Proceed as follows:

Step	Action
1	Start the XPSMCWIN configuration software. <b>Result:</b> The program user interface appears.
2	Drag the symbol of the desired controller from the <b>Device Library</b> window into the still empty <b>Configuration</b> window.
3	Release the left mouse button and a new configuration is automatically created. <b>Result:</b> Fill in the window which has opened. <b>Note:</b> If the window does not open automatically, you are prompted to activate automatic opening in the <b>Options editor</b> menu option. The following figure shows the <b>Configuration</b> dialog box: 



Step	Action
4	<p>Click on the relevant <b>change...</b> button to provide for adjustments for the future Modbus and Profibus communication.</p> <p>The following figure shows the <b>Controller</b> dialog box:</p> 
5	<p>Click on the <b>change...</b> button of Modbus or Profibus.</p>

Step	Action
6	<div><p>Fill in the window which has opened.</p><p>The following figure shows the <b>Modbus Parameters</b> dialog box:</p><div><div>Modbus Parameters</div><div><div>connect</div><div><div>↓</div><div><div><div><input checked="" type="checkbox"/> Controller 1:</div><div><div>Address (1-247)</div><div>1</div></div><div><div>Bit Rate</div><div>19200</div></div><div><div>Parity</div><div>even</div></div></div><div><div><input type="checkbox"/> Controller 2:</div><div><div>Address (1-247)</div><div></div></div><div><div>Bit Rate</div><div></div></div><div><div>Parity</div><div></div></div></div><div><div><input type="checkbox"/> Controller 3:</div><div><div>Address (1-247)</div><div></div></div><div><div>Bit Rate</div><div></div></div><div><div>Parity</div><div></div></div></div><div><div><input type="checkbox"/> Controller 4:</div><div><div>Address (1-247)</div><div></div></div><div><div>Bit Rate</div><div></div></div><div><div>Parity</div><div></div></div></div><div><div><input type="checkbox"/> Controller 5:</div><div><div>Address (1-247)</div><div></div></div><div><div>Bit Rate</div><div></div></div><div><div>Parity</div><div></div></div></div><div><div><input type="checkbox"/> Controller 6:</div><div><div>Address (1-247)</div><div></div></div><div><div>Bit Rate</div><div></div></div><div><div>Parity</div><div></div></div></div><div><div><input type="checkbox"/> Controller 7:</div><div><div>Address (1-247)</div><div></div></div><div><div>Bit Rate</div><div></div></div><div><div>Parity</div><div></div></div></div><div><div><input type="checkbox"/> Controller 8:</div><div><div>Address (1-247)</div><div></div></div><div><div>Bit Rate</div><div></div></div><div><div>Parity</div><div></div></div></div></div><div><div><input type="checkbox"/> different Modbuses</div></div><div><div>Download</div><div>OK</div><div>Cancel</div></div></div></div><p>The following figure shows the <b>Profibus Parameters</b> dialog box:</p><div><div>Profibus Parameters</div><div><div>connect</div><div><div>↓</div><div><div><div><input checked="" type="checkbox"/> Controller 1:</div><div><div>Address (1-125)</div><div>2</div></div></div><div><div><input type="checkbox"/> Controller 2:</div><div><div>Address (1-125)</div><div></div></div></div><div><div><input type="checkbox"/> Controller 3:</div><div><div>Address (1-125)</div><div></div></div></div><div><div><input type="checkbox"/> Controller 4:</div><div><div>Address (1-125)</div><div></div></div></div><div><div><input type="checkbox"/> Controller 5:</div><div><div>Address (1-125)</div><div></div></div></div><div><div><input type="checkbox"/> Controller 6:</div><div><div>Address (1-125)</div><div></div></div></div><div><div><input type="checkbox"/> Controller 7:</div><div><div>Address (1-125)</div><div></div></div></div><div><div><input type="checkbox"/> Controller 8:</div><div><div>Address (1-125)</div><div></div></div></div></div><div><div>Download</div><div>OK</div><div>Cancel</div></div></div></div><p>As the PC is not yet connected to controller 1, the Modbus settings cannot yet be sent at this level to controller 1.</p><p>You can download only the parameters (no configuration) for the Modbus and Profibus by clicking on the <b>Download</b> button when your PC is connected to the safety controller.</p></div></div></div>

Step	Action
7	<div><p>Click <b>OK</b>.</p><p><b>Result:</b> Your screen should now look like the one in this figure:</p></div>

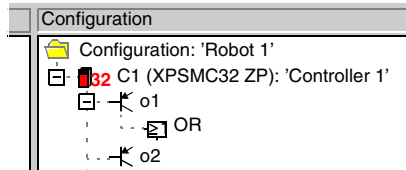
## Assigning the Switch Position

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### Introduction

For safety reasons, a position switch is necessary, which determines if the machine will be started with the safety guard OR with the enabling switch (see the block diagram in the chapter *Generals*, p. 117).

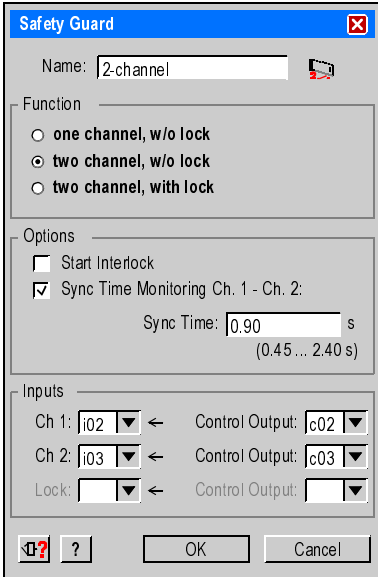
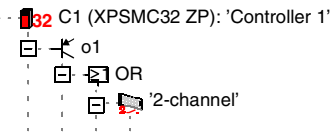
To configure this OR connection, the symbol of the OR device has to be moved to the o1 output as follows:



## Assigning the Protective Guard Function

### Procedure


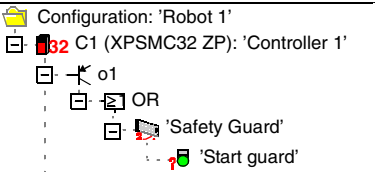
Proceed as follows:

Step	Action
1	<p>In the <i>Safety Guard</i> folder (which is located in the <i>Monitoring Devices</i> folder), select the 2-channel protection door symbol, and drag it onto the symbol of the OR component.</p> <p><b>Result:</b> A window opens, in which you have to define the function properties, for example:</p> 
2	<p>Confirm with <b>OK</b>.</p> <p><b>Result:</b> The protection door device is then assigned with the OR component to safety output o1.</p> 

## Assigning the Starting Function

Procedure

Proceed as follows:

Step	Action
1	<p>In the <i>Start Devices</i> folder, which is located in the <i>Monitoring Devices</i> folder, select the <b>Monitored Start</b> device symbol and drag-and-drop it to the <b>Safety Guard Device</b> in the configuration window.</p> <p><b>Result:</b> A dialog box for the definition of the function properties opens. The following figure shows an example of the dialog box:</p> 
2	<p>Confirm with <b>OK</b>.</p> <p><b>Result:</b> The <b>Monitored Start Device</b> is assigned to the Safety Guard device safety output o1.</p> 

## Assigning the Enabling Device

**Introduction** According to this example application, the safety guard can be bypassed by the 3 channel enabling device. This gives the possibility for the Robot to run with the safety guard open when the 3 channel enabling device is used (when selector switch is in appropriate position).

**Procedure** Proceed as follows:

Step	Action
1	<p>Drag the 3-channel enabling device symbol from the <i>Enabling Devices</i> folder onto the <b>OR Device</b> symbol in the <b>Configuration</b> window and fill in the window.</p> <div><div>Enable Switch</div><div><div>Name: Enable Device Robot 1</div><div>Function<div><div>two channels</div><div>three channels</div></div></div><div>Options<div><div>Enable Time Monitoring:</div><div>Enable Time: min (0.5 ... 10 min)</div></div></div><div>Inputs<div><div>Ch 1: i06 NO ← Control Output: c05</div><div>Ch 2: i07 NC ← Control Output: c06</div><div>Ch 3: i08 NO ← Control Output: c07</div></div></div><div><div>OK</div><div>Cancel</div></div></div></div>
2	<p>Confirm with <b>OK</b>. The following image shows the resulting configuration:</p> <div><div>Configuration: 'Robot 1'</div><div><div>C1 (XPSMC32 ZP): 'Controller1'</div><div><div>o1</div><div>OR</div><div><div>'2-channel'</div><div>'Start guard'</div><div>'Enabling Device Robot 1'</div></div></div></div></div>

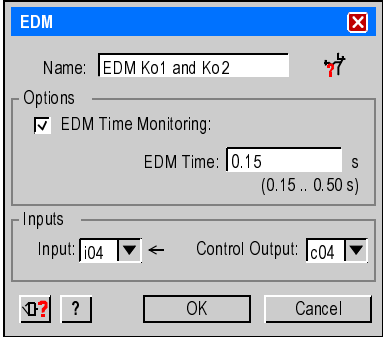
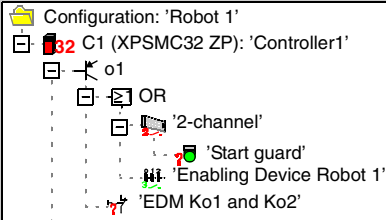
## EDM Adjustment

### Introduction

The opening contacts of switches Ko1 and Ko2 must be defined with a synchronization time of 0.2 s, i.e. within 0.2 s after the activation of safety outputs o1 and o2, and the return circuit must be open.

### Procedure

Proceed as follows:

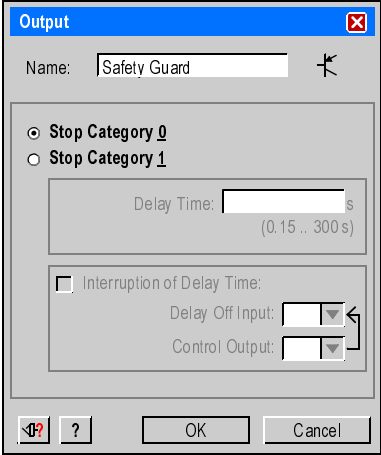
Step	Action
1	<p>Drag the EDM symbol from the <i>EDM Devices</i> folder onto symbol <b>o1</b> in the <b>Configuration</b> window.</p> <div></div>
2	<p>Confirm with <b>OK</b>.</p> <p>The following image shows the resulting configuration:</p> <div></div>



## Assign a Name and a Stop Category to a Safety Output

### Procedure

Proceed as follows:

Step	Action
1	Click the right mouse button on its function symbol in the <b>Configuration</b> window to assign a name and a stop category to safety output o1.
2	Select the <b>Properties</b> menu option. Indicate a name and the stop category. 
3	Confirm with <b>OK</b> . <b>Result:</b> This completes the configuration of safety output o1.

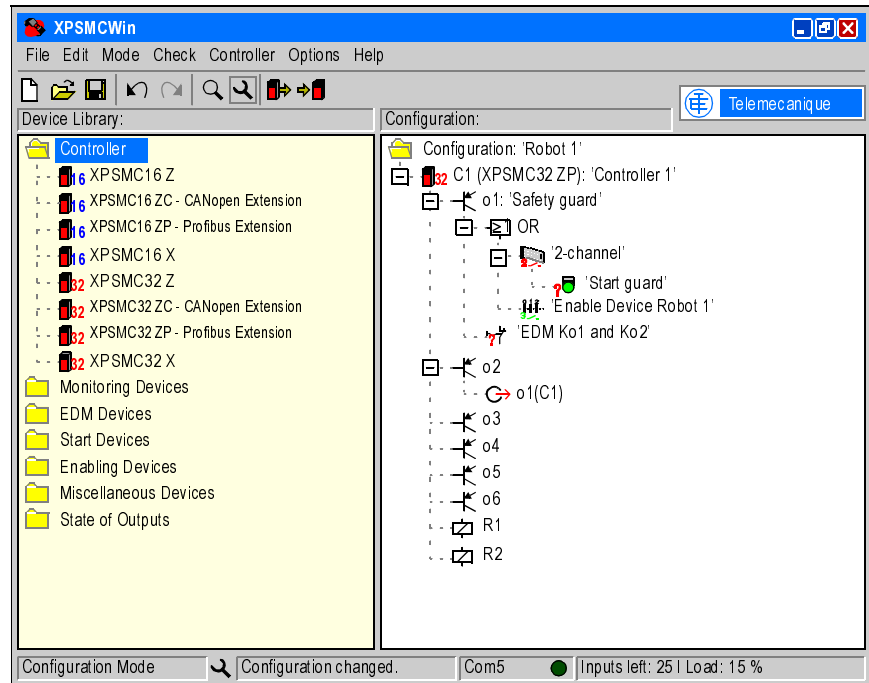
## Copying the State of One Safety Output onto another Safety Output

### Description

In our example, **o2** represents the 2nd channel of a safety control system, and must consequently behave exactly like **o1**. Left-click **o1** in the configuration window, then drag and drop it onto **o2**.

The global protection door function is then configured for safety outputs o1 and o2.

Your screen should look like the one below:



5.3

Configuring the Emergency Stop Function

At a Glance

Overview

This section contains the configuration description of the **Emergency Stop** function.

What's in this Section?


This section contains the following topics:

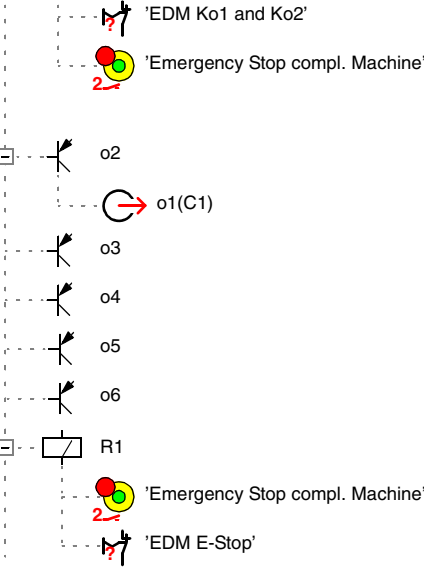
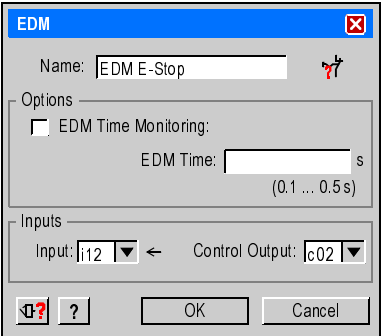
Topic	Page
Emergency Stop	132
Master E-Stop Device	136

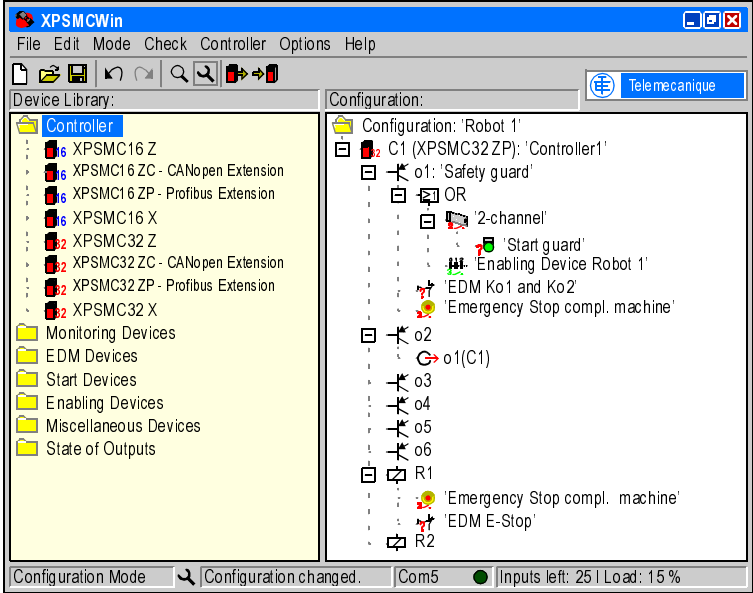
## Emergency Stop

**Description** Depending on the application, the machine's global control system must be able to be stopped by means of Emergency Stop button S1 which activates free outputs 13 / 14 and 23 / 24 of relay group R1. Their contactors KE1 and KE2 are assigned to ensure that when the machine is started, KE1 and KE2 are stopped in a statutory fashion.

**Procedure** Proceed as follows:

Step	Action
1	<p>Drag the <i>Two-Channel Emergency Stop</i> symbol from the <i>Emergency Stop</i> folder (which is located in the <i>Monitoring Devices</i> folder) onto the output symbol of R1 in the <b>Configuration</b> window, and fill in the window.</p> <div></div>
2	<p>Confirm with <b>OK</b>. <b>Result:</b> Now the <i>E-Stop</i> device is assigned to the safety relays group R1.</p>
3	<p>To also assign it to the solid state output o1, click with the right mouse button on the <i>E-Stop</i> device in the <b>Configuration</b> window.</p>
4	<p>Choose <b>Copy</b> from the selection. <b>Result:</b> The <i>E-Stop</i> device will then be copied with all its properties.</p>
5	<p>Click with right mouse button on the symbol of the output o1.</p>

Step	Action
6	<p>Select <b>Paste</b> and <b>as copy of device</b>.</p> <p><b>Result:</b> The <i>E-Stop</i> device will now also act on the output o1, and as the output state o1 is linked with o2, it will also act on o2.</p> <p><b>Note:</b> To view the copies of a device, right click the mouse on the device. Mark e.g. E-Stop and select the menu <b>Mark Copies</b>. On the copies a green bubble appears. To remove the bubbles click <b>Unmark Copies</b>.</p> 
7	<p>To adjust the return circuit, drag the EDM device symbol from the <i>EDM Devices</i> folder onto the symbol for R1 in the <b>Configuration</b> window, fill in the dialog box in accordance with the application.</p> 

Step	Action
8	<p>Confirm with <b>OK</b>.</p> <p><b>Result:</b> This ensures that the installation can only be started when KE1 and KE2 are closed and the external start conditions (ESC) are fulfilled.</p> <p><b>Note:</b> If a control output c1...c8 has been used, a "*" follows the name, for example "c2*", appears when this output is selected.</p> <p>The user must guarantee that no dangerous fault can occur when this control output is used more then once, as a dangerous short-circuit, for example, is no longer detected.</p> <p>Your screen should now look like the one below:</p>  <p>The screenshot shows the XPSMCWin application window. The title bar reads 'XPSMCWin'. The menu bar includes 'File', 'Edit', 'Mode', 'Check', 'Controller', 'Options', and 'Help'. Below the menu bar is a toolbar with icons for file operations and a 'Telemechanique' button. The main window is divided into two panes. The left pane, titled 'Device Library', contains a tree view with folders like 'Monitoring Devices', 'EDM Devices', 'Start Devices', 'Enabling Devices', 'Miscellaneous Devices', and 'State of Outputs', and a list of XPSMC modules (XPSMC16 Z, XPSMC16 ZC - CANopen Extension, XPSMC16 ZP - Profibus Extension, XPSMC16 X, XPSMC32 Z, XPSMC32 ZC - CANopen Extension, XPSMC32 ZP - Profibus Extension, XPSMC32 X). The right pane, titled 'Configuration', shows a hierarchical tree for 'Configuration: Robot 1'. It includes 'C1 (XPSMC32 ZP): Controller1' with sub-items like 'o1: Safety guard', 'OR', '2-channel', 'Start guard', 'Enabling Device Robot 1', 'EDM Ko1 and Ko2', and 'Emergency Stop compl. machine'. Below this are 'o2', 'o1(C1)', 'o3', 'o4', 'o5', 'o6', 'R1', 'Emergency Stop compl. machine', 'EDM E-Stop', and 'R2'. At the bottom of the window, a status bar shows 'Configuration Mode', 'Configuration changed.', 'Com5', a green circle, and 'Inputs left: 25   Load: 15 %'.</p>
9	<p>Complete the creation of the example configuration by saving and download it to the XPSMC.</p>

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## **WARNING**

### **LOSS OF SAFETY INPUT CROSS-CONNECTION DETECTION**

Ensure that no more than one critical safety input is connected to each of the control outputs.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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## Master E-Stop Device

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### Description

A *E-Stop* device acts as a Master E-Stop on all the other devices of the output. The other devices will be deactivated when the Master E-Stop is pressed. When this occurs, the start of this output is not possible until the start conditions of all the other devices are met.

This is also available for all the copies of the *E-Stop* devices.

**Note:** An output state does not transfer a master E-Stop command on other devices. Only the status itself is transferred.

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## 5.4 Save the Configuration

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### Save

#### Description

The configuration can be saved by opening the **File** → **Save** menu option (or by clicking on the floppy disk symbol button  ) under the current name or by opening the **File** → **Save As...** option and assigning a new path/name.

**Note:** When you close the configuration file and then open it again, a back-up copy is created in the same directory, with a *.mcb* extension. This way your last saved and closed configuration is stored as a back-up file.

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## 5.5 Requesting/Changing the Password

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### Password

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#### Enter Password

**Note:** Your PC must be connected to the XPSMC safety controller.

Each XPSMC command involving quitting the RUN mode (setting up the XPSMC for example) must be confirmed with a password. If such a command is performed, a dialogue window opens in which the password must be entered.

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#### Change Password

The default password is `safety`; as a safety measure, it must be changed to an individual password. The password must contain between 4 and 12 symbols. Any combination of letters and numbers may be used.

The password can be modified with command **Controller** → **Change password**.

**Note:** The password is case sensitive. *Security* and *security* are thus two different passwords.

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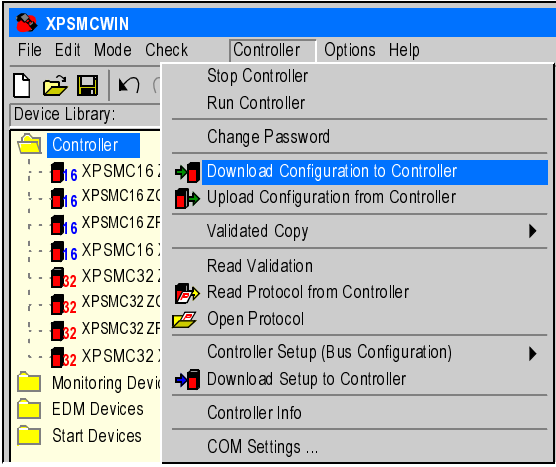
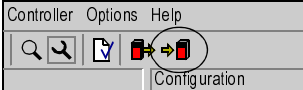
## 5.6 Sending a Configuration from the PC to the XPSMC and Performing a Check

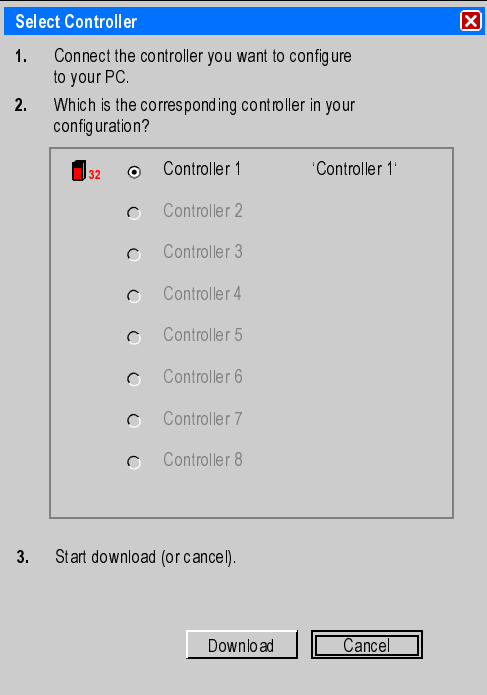
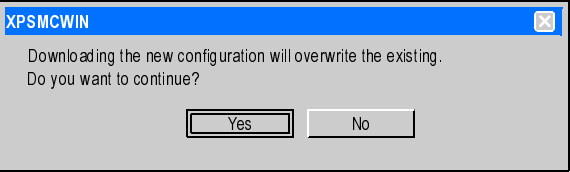
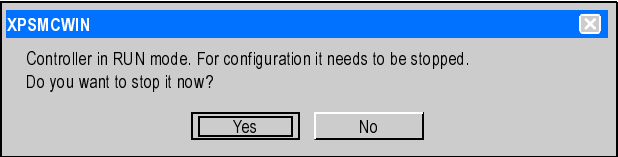
### Sending a Configuration

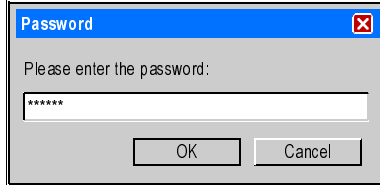
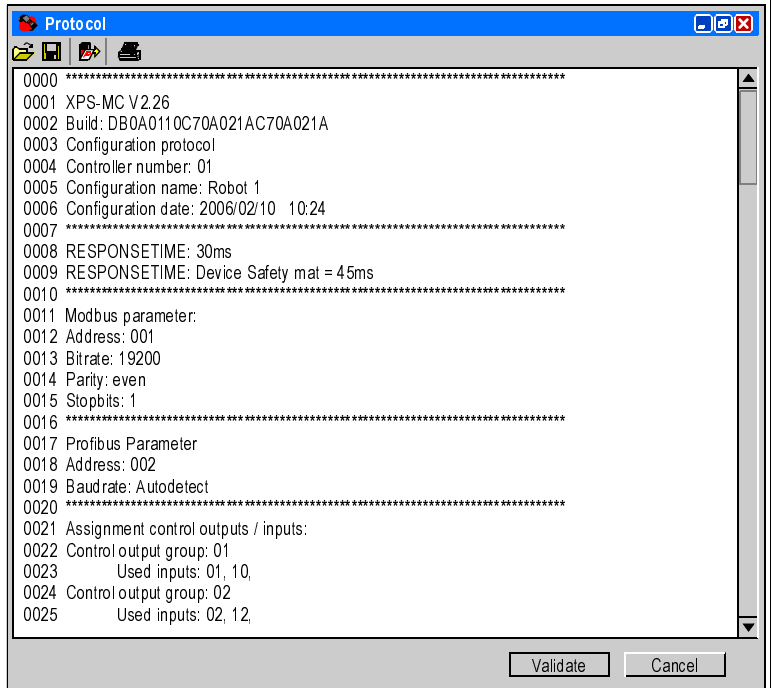
#### Procedure

To send a completed configuration from the PC to the safety controller, follow this procedure:

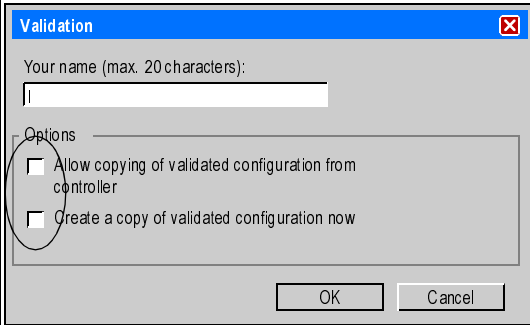
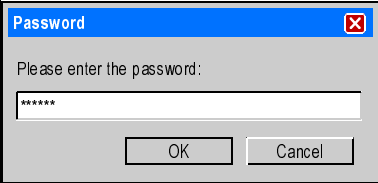
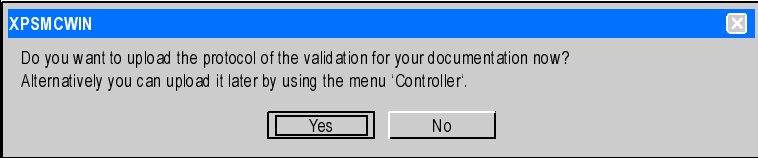
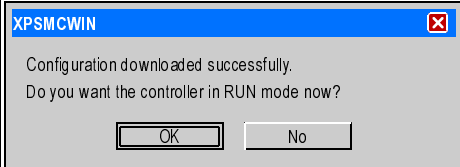
Step	Action
1	<p>Select <b>Check</b> → <b>Check Configuration</b> to check the configuration. You can click on the <b>Check Configuration</b> icon alternatively:</p>  <p><b>Result:</b> If the configuration contains no errors, the following message box appears:</p>  <p>If the configuration contains errors, a yellow question mark will be seen, and a corresponding message box will appear.</p>

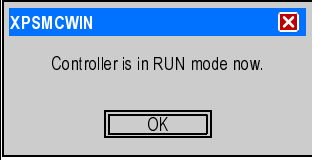
Step	Action
2	<div>Go to <b>Controller</b> → <b>Download Configuration to Controller</b> to download the configuration:</div> <div></div> <div>You can click on the <b>Configuration</b> icon alternatively:</div> <div></div>

Step	Action
3	<p>Click on the <b>Download</b> button.</p>  <p><b>Result:</b> If the controller already has a configuration, the following message will appear:</p> 
4	<p>Click <b>Yes</b> to continue the procedure.</p> <p><b>Result:</b> If the controller is in RUN mode, the following message will appear:</p> 

Step	Action
5	<p>Click <b>Yes</b> to continue the procedure.</p> <p><b>Result:</b> To stop the controller, enter your password (default password is <i>safety</i> in lower case)</p>  <p>A small dialog box titled 'Password' with a close button (X) in the top right corner. It contains the text 'Please enter the password:' followed by a text input field with six asterisks (*****). At the bottom are 'OK' and 'Cancel' buttons.</p>
6	<p>Click <b>OK</b> to continue.</p> <p><b>Result:</b> The download procedure is starting. After the download, you will see the protocol:</p>  <p>A window titled 'Protocol' with a standard Windows-style title bar and icons. It contains a list of configuration parameters and their values, separated by asterisks. At the bottom are 'Validate' and 'Cancel' buttons.</p> <pre> 0000 ***** 0001 XPS-MC V2.26 0002 Build: DB0A0110C70A021AC70A021A 0003 Configuration protocol 0004 Controller number: 01 0005 Configuration name: Robot 1 0006 Configuration date: 2006/02/10 10:24 0007 ***** 0008 RESPONSETIME: 30ms 0009 RESPONSETIME: Device Safety mat = 45ms 0010 ***** 0011 Modbus parameter: 0012 Address: 001 0013 Baudrate: 19200 0014 Parity: even 0015 Stopbits: 1 0016 ***** 0017 Profibus Parameter 0018 Address: 002 0019 Baudrate: Autodetect 0020 ***** 0021 Assignment control outputs / inputs: 0022 Control output group: 01 0023     Used inputs: 01, 10, 0024 Control output group: 02 0025     Used inputs: 02, 12, </pre> <p><b>Note:</b> Read this protocol carefully and check it with your hardware configuration. With <b>Validate</b> you confirm the correctness of the software configuration in the controller shown in the protocol.</p>
7	Click on <b>Validate</b> button to validate the protocol.



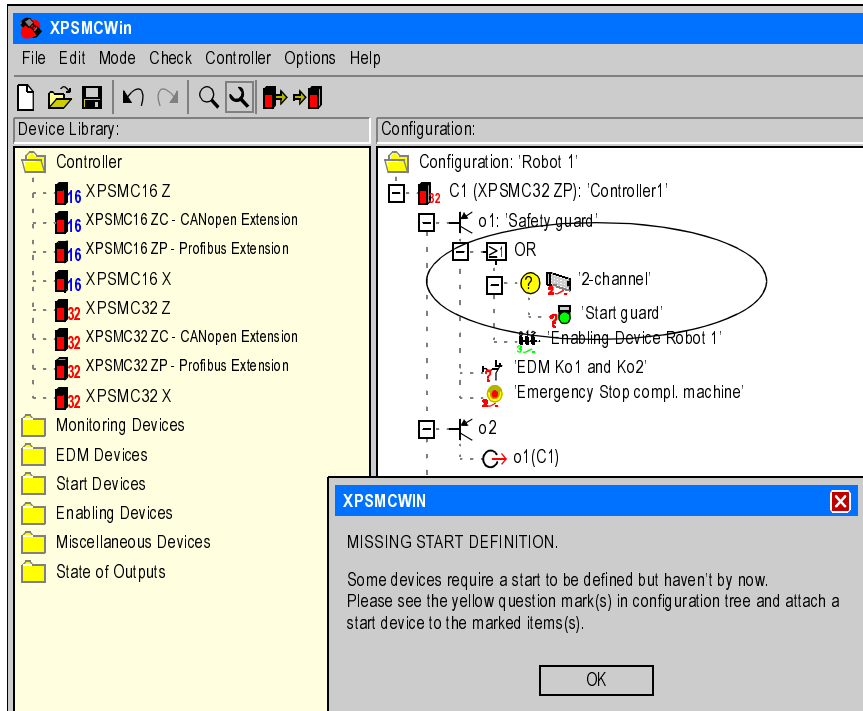
Step	Action
8	<p>Enter your name in the <b>Validation</b> dialog box:</p>  <p>The <b>Validation</b> dialog box has a title bar with a close button. It contains a text input field for 'Your name (max. 20 characters):'. Below it is an 'Options' section with two checkboxes: 'Allow copying of validated configuration from controller' and 'Create a copy of validated configuration now'. The 'Create a copy of validated configuration now' checkbox is circled. At the bottom are 'OK' and 'Cancel' buttons.</p>
9	<p>Click <b>OK</b> to continue.</p> <p><b>Result:</b> The <b>Password</b> dialog box will be displayed:</p>  <p>The <b>Password</b> dialog box has a title bar with a close button. It contains a text input field for 'Please enter the password:' with masked characters (*****). At the bottom are 'OK' and 'Cancel' buttons.</p>
10	Enter your password and click <b>OK</b> .
11	<p>Click <b>OK</b> to continue.</p> <p><b>Result:</b> The following message will be displayed:</p>  <p>The <b>XPSMCWIN</b> dialog box has a title bar with a close button. It contains the text: 'Do you want to upload the protocol of the validation for your documentation now? Alternatively you can upload it later by using the menu 'Controller'.'. At the bottom are 'Yes' and 'No' buttons.</p>
12	<p>Click <b>Yes</b> to upload the protocol.</p> <p><b>Result:</b> The following message will be displayed:</p>  <p>The <b>XPSMCWIN</b> dialog box has a title bar with a close button. It contains the text: 'Configuration downloaded successfully. Do you want the controller in RUN mode now?'. At the bottom are 'OK' and 'No' buttons.</p>

Step	Action
13	<p>Click <b>OK</b> to start the controller.</p> <p><b>Result:</b> The following message will be displayed</p> 
14	Click <b>OK</b> to finish the procedure.

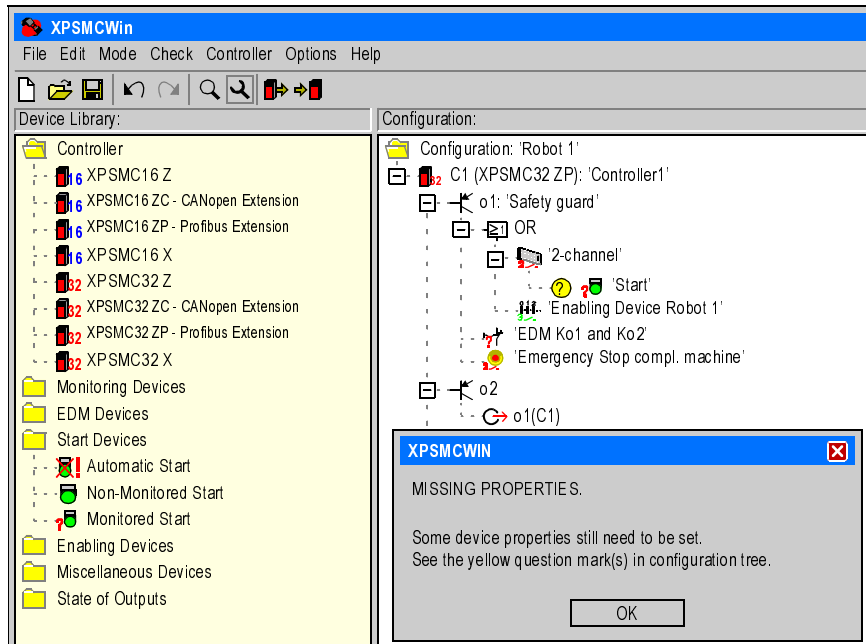
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## Typical Configuration Errors

Configuration error 1: If you forgot to assign a start device to the **Two-Channel Safety Guard**, the main window and the message box will look as follows:



Configuration error 2: If you forgot to set the inputs and outputs of the start device, the main window and the message box will look as follows:




## 5.7 Loading a Configuration

### Loading

**Description** The configuration of a controller can be uploaded at any time without stopping the controller.

**Procedure** Proceed as follows:

Step	Action
1	Connect your PC to the XPSMC safety controller.
2	Choose the command <b>Controller</b> → <b>Upload Configuration from Controller</b> or click on the button  in the toolbar. <b>Reaction:</b> The configuration is loaded from the XPSMC and then represented in the usual tree structure.



---

## 5.8                      **Creation/Transfer of a Validated Configuration Copy**

---

### **At a Glance**

---

**Overview**                      This section contains the description of creation and transfer a validated configuration copy.

---

**What's in this Section?**                      This section contains the following topics:

Topic	Page
Copy/Saving of a Validated Configuration	152
Transfer of a Validated Configuration Copy	153

---

## Copy/Saving of a Validated Configuration

---

### Condition

As a condition to create a copy of a validated configuration, the **Enable copying of validated configuration from controller** option must be selected during the validation of the configuration, see also *Sending a Configuration*, p. 141, step for the validation. Under this condition the user is able to make a copy of the validated configuration from the XPSMC into a binary file at any time. In addition, the **Create a copy of the validated configuration now** option can be selected in order to immediately create such a copy during the validation.

---

### Copy of a Validated Configuration

Included with the configuration itself, the following data of the original controller is taken:

- validation counter (VDC)
- password
- validation data (name, date)
- device parameters (Modbus parameters, controller number)

This file can be used as a safety copy to transfer the validated configuration to another controller without the need of a new validation.

---

### Saving a Validated Configuration

Proceed as follows:

Step	Action
1	Connect the PC to the controller containing the validated configuration which is free for copy.
2	Choose the command <b>Controller</b> → <b>Create validated copy</b> . <b>Result:</b> The configuration will be read out of the controller.
3	Enter the save location and file name in the window which appears. <b>Result:</b> The copy will be saved as this file.

---



---

## Transfer of a Validated Configuration Copy

---

### Description

When a file with a copy of a validated configuration has been made (see chapter *Copy/Saving of a Validated Configuration*, p. 152) for a certain controller, it is easy to transfer the configuration into another controller, especially for replacement of a XPSMC unit for service or for installation of controllers in identical machines.

### Procedure 1 - New Controller

Proceed as follows:

Step	Action
1	Connect the PC to the controller in which the validated configuration is to be transferred. <b>Result:</b> The controller is not configured, the Power LED is on, and the CNF LED is blinking.
2	Choose the command <b>Controller → Validated copy → Transfer validated copy to controller</b> . <b>Result:</b> You get 2 messages: <ul style="list-style-type: none"><li>● Please connect the controller you want the configuration to transfer to and press 'OK' to start the transfer.</li><li>● Transferring the copy will overwrite the existing configuration in the controller. Do you want to continue?</li></ul>
3	Indicate in the appearing window the name of the validated configuration file. <b>Result:</b> The validated configuration is transferred into the connected controller. A message box tells you to powercycle the controller to start the new configuration.

---

**Procedure 2 -  
Configured  
Controller,  
Password  
Available**

Proceed as follows:

Step	Action
1	Connect the PC to the controller in which the validated configuration is to be transferred.
2	Choose the command <b>Validated copy → Transfer validated copy to controller</b> . <b>Note:</b> If the controller is running, another message box reminds you that the controller has to be stopped. You will also be reminded to enter your password. If you do not have a password, you will have to reset the controller by powercycling it and simultaneously pressing the Reset button. See also <i>Procedure 1 - New Controller, p. 153</i> for downloading a validated copy.
3	Indicate in the appearing window the name of the file. <b>Result:</b> The validated configuration is picked out from the file and transferred into the connected controller. A message box tells you that you have to powercycle the controller to start the new configuration and run the controller.

---

<b>Note:</b> To modify the configuration, you need the password of the validated configuration. The controller password has been overwritten.
---

---

**Procedure 3 -  
Configured  
Controller,  
Password  
Unavailable**

Reset the controller by pressing the Reset button and simultaneously performing a power cycle. Then follow *Procedure 1 - New Controller, p. 153*.

**Validated  
Configuration  
into another  
Controller**

---

The new controller now has the validated configuration, including the validation counter (VDC), the password, the validation data (name, date) and the device parameters (Modbus parameters, controller number).

It can be used like the original controller from which the copy was made from, except that the running time (OPC) of the configuration is set to zero.

---

---

## 5.9 Read Protocol from Controller

---

### Read Protocol from Controller

---

#### Procedure

Proceed as follows:

Step	Action
1	Connect the PC to the XPSMC safety controller.
2	The controller has to be put in Stop mode with the menu <b>Controller</b> → <b>Stop Controller</b> .
3	A window appears, and you are asked to enter your password to stop the controller.
4	Choose the menu <b>Controller</b> → <b>Read Protocol from Controller</b> . <b>Result:</b> The protocol will be displayed in a separate window and can be printed. <b>Note:</b> This print is just a work tool. The only proof of the correctness of the configuration is the validated and signed protocol. (See chapter <i>Sending a Configuration</i> , p. 141)

---




XPSMC Safety Controller Diagnostics

**Introduction** Various states of an XPSMC can be loaded from a PC for fault diagnostics and error finding purposes.

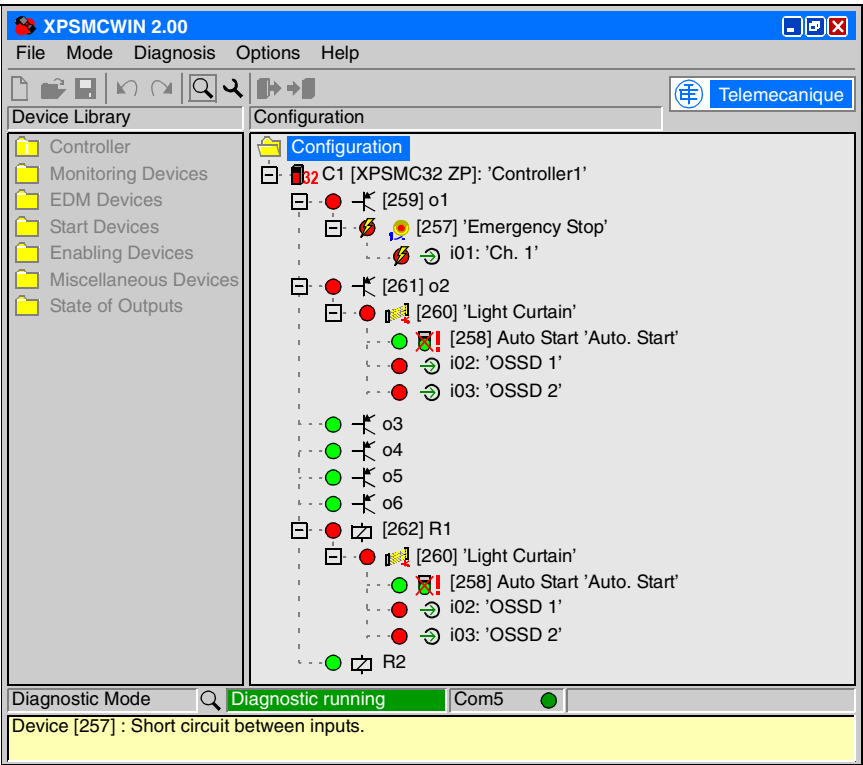
**Note:** During the fault diagnostics, the XPSMC continues to operate without being influenced, to allow the progress of a complete machine cycle to be monitored.

**Procedure** The fault Diagnostic mode is activated as follows:

Step	Action
1	Connect your PC to the XPSMC safety controller in operation.
2	Start the XPSMCWIN software.
3	Open a configuration from a file or upload the configuration from the controller. <b>Note:</b> During the opening of a saved configuration from a file, the configuration must correspond to the one already in the controller. The controller configuration must have been validated.
4	Choose the Diagnostic mode. To do this, choose the menu <b>Mode → Diagnostic</b> or click on the icon  for the Diagnostic mode. <b>Result:</b> The window will become grey, to show that no modifications can be made.

**Color Definitions** In the **Configuration** window, a colored circle is placed next to each function symbol of the configuration tree.

The color indicates the current status of the corresponding function:



Meaning of symbols

Symbols	Meaning
Red Point	The safety output concerned is deactivated, or this device has not been validated (for example, protection door open, Emergency Stop not initiated, etc.), or the concerned input is opened.
Red Point with a Yellow Flash	An error exists for this device (input/output). The error message will then be shown by clicking on the device.
Green Point	The safety output concerned is activated, or this device has been validated (for example, protection door closed, emergency stop initiated, etc.), or the concerned input is closed.

Symbols	Meaning
Green Point with a Hourglass	This output has a category 1 stop. The commutation conditions are no longer fulfilled, but the time delay is not yet finished.
Yellow Point	This component or this outputs are enabled (i.e. the starting conditions are fulfilled), but not yet started.
Grey Point	The safety output concerned is not used, or the PC has not yet received the fault diagnostics data from the XPSMC (all the points are then dimmed).

### Fault Diagnostics of Different Devices

Proceed as follows

Step	Action
1	Click on the symbol of the device to see the state of the inputs of the different devices
2	Click the right mouse button within the <b>Diagnostic</b> window. <b>Result:</b> A special menu will appear.
3	Select <b>Overview</b> from the menu. <b>Result:</b> A new window appears displaying the diagnostics of all the inputs and outputs of the controller.
4	Click on <b>Pause diagnostic</b> in the menu <b>Diagnostics</b> to pause the diagnostics. <b>Result:</b> The <b>Diagnostic</b> window keeps the status.
5	Click on <b>Start diagnostic</b> in the menu <b>Diagnostics</b> to start the diagnostics. <b>Result:</b> The window will be continuously updated.





---

# Appendices



---

## At a glance

Overview	Additional information that is not necessarily required for an understanding of the documentation.							
What's in this Appendix?	The appendix contains the following chapters:							
	<table><tr><th>Chapter</th><th>Chapter Name</th><th>Page</th></tr><tr><td>A</td><td>Wiring (Examples) and Functional Diagrams</td><td>163</td></tr></table>	Chapter	Chapter Name	Page	A	Wiring (Examples) and Functional Diagrams	163	
Chapter	Chapter Name	Page						
A	Wiring (Examples) and Functional Diagrams	163						

---



---

# Wiring (Examples) and Functional Diagrams



---

## At a Glance

### Overview

This chapter contains examples of wiring and functional diagrams.

**Note:** The data for safety categories in accordance with EN 954-1 refers to the maximum achievable categories. The machine control must also be appropriately configured in order to achieve the desired category.

**What's in this Chapter?**

This chapter contains the following topics:

<b>Topic</b>	<b>Page</b>
Electrical Diagram for the XPSMC	165
Three One-Channel Emergency Stops, with Automatic Start	167
Two Two-Channel Emergency Stop, with Start Button	169
Safety Guard with One Channel	171
Two Channel Safety Guard	174
Two Channels Safety Guard with Lock	178
Light Curtain with Relay Outputs	182
Light Curtain with Transistor Outputs	186
Muting for Light Curtains Type 4	190
Magnetic Switch	192
Two-Hand Control	196
Safety Mat	198
Zero Speed Detection	200
Injection Molding Machines	204
Hydraulic Press Valve Monitoring	207
Hydraulic Press 2	209
Eccentric Press	215
Eccentric Press 2	219
Selector Switch	224
Timer	226
Shaft/Chain-Break Monitoring	229
Seat Valve Monitoring	231
Enabling Device 2 Channel	233
Enabling Device 3 Channel	235
Foot Switch	237

---

## Electrical Diagram for the XPSMC

**Response Time** When not other mentioned the following drawings show a XPSMC16 with a response time of 20 ms.

### Wiring Diagram

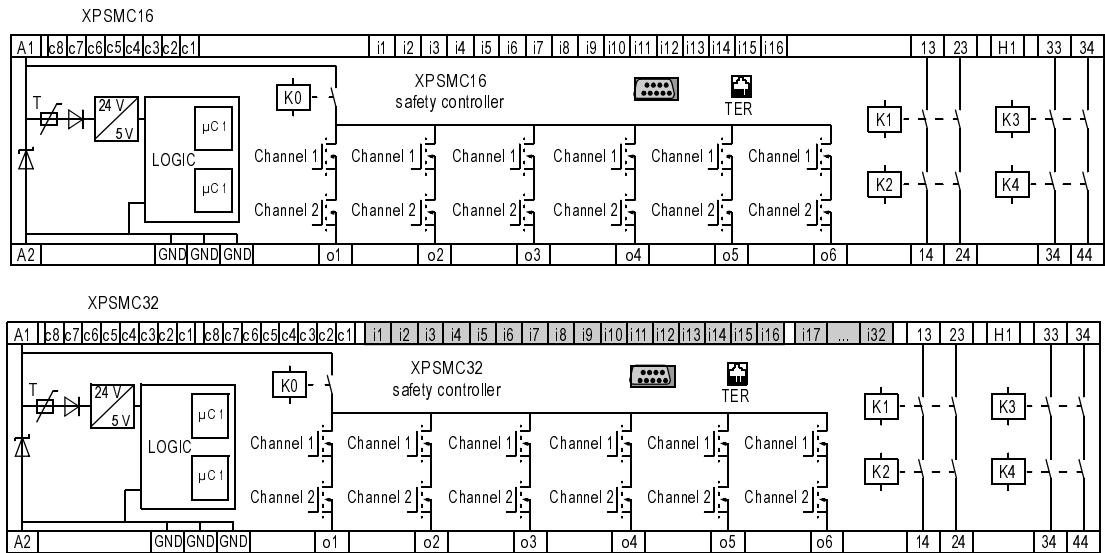
**⚠ DANGER**

#### HAZARDOUS VOLTAGE

Disconnect all power before servicing equipment.


**Failure to follow these instructions will result in death or serious injury.**

#### XPSMC16 / XPSMC32



The static outputs are rated category 4 according to EN954-1.

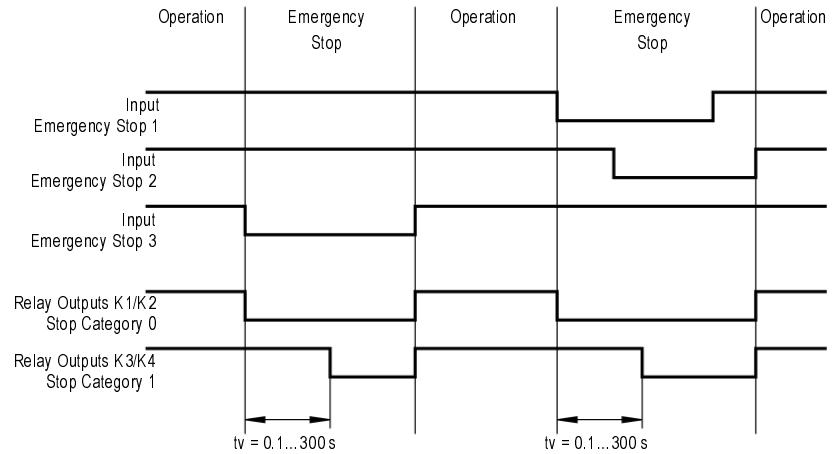
**Technical Data** Description of terminals

Terminal Layout	Meaning
A1-A2	24V  power supply; A1 is the + pole (+24 VDC), A2 is the - pole (0 VDC, GND)
GND	It is identical to the 0 V potential on A2 for loads on the o1...o6 semiconductor safety outputs.
c1-c8	control outputs for safety input power supply The control outputs contain a signal which enables short circuit detection monitoring, voltage intrusion and open circuit detection for all connected control components.
i1-i16 or i1-i32	safety inputs
H1	connection for muting lamp
o1-o6	semiconductor safety outputs
13/14, 23/24, 33/34, 43/44	safety outputs, potential free
TER	8 pin RJ45 connector used to connect the XPSMC safety controller to a PC for configuration and/or diagnostics. The communication via the TER terminal is Modbus RTU protocol and can also be used to connect to a HMI magelis operating terminal, or a standard PLC.
Fieldbus	connector for a fieldbus dependant on version: <ul style="list-style-type: none"> <li>● Profibus DP: 9 pin D-SUB female connector</li> <li>● CANopen: 9 pin D-SUB male connector.</li> </ul>

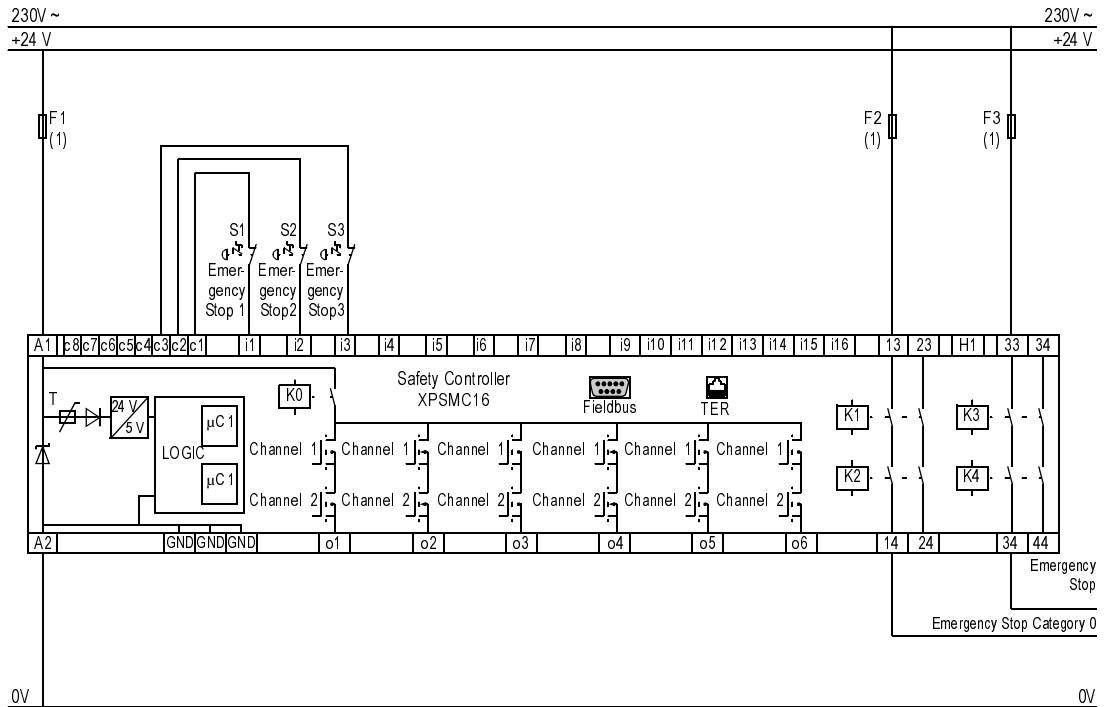
## Three One-Channel Emergency Stops, with Automatic Start

### Functional Diagram

The following diagram shows three One-Channel Emergency Stops and the relevant control outputs for categories 0 and 1:



**Wiring Diagram** The following image shows the wiring diagram of the One-Channel Emergency Stop:



(1) See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.

**Note:** A jumper between the 2 terminals of an Emergency Stop will not be recognised. Short-circuit between i1, i2, i3 will be recognised.

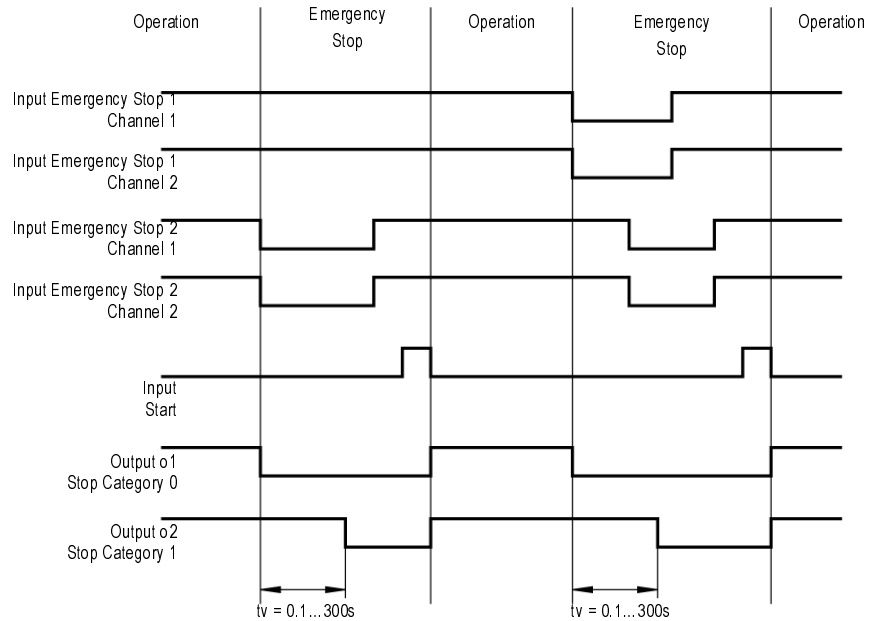
The static outputs are rated category 4 according to EN954-1.



## Two Two-Channel Emergency Stop, with Start Button

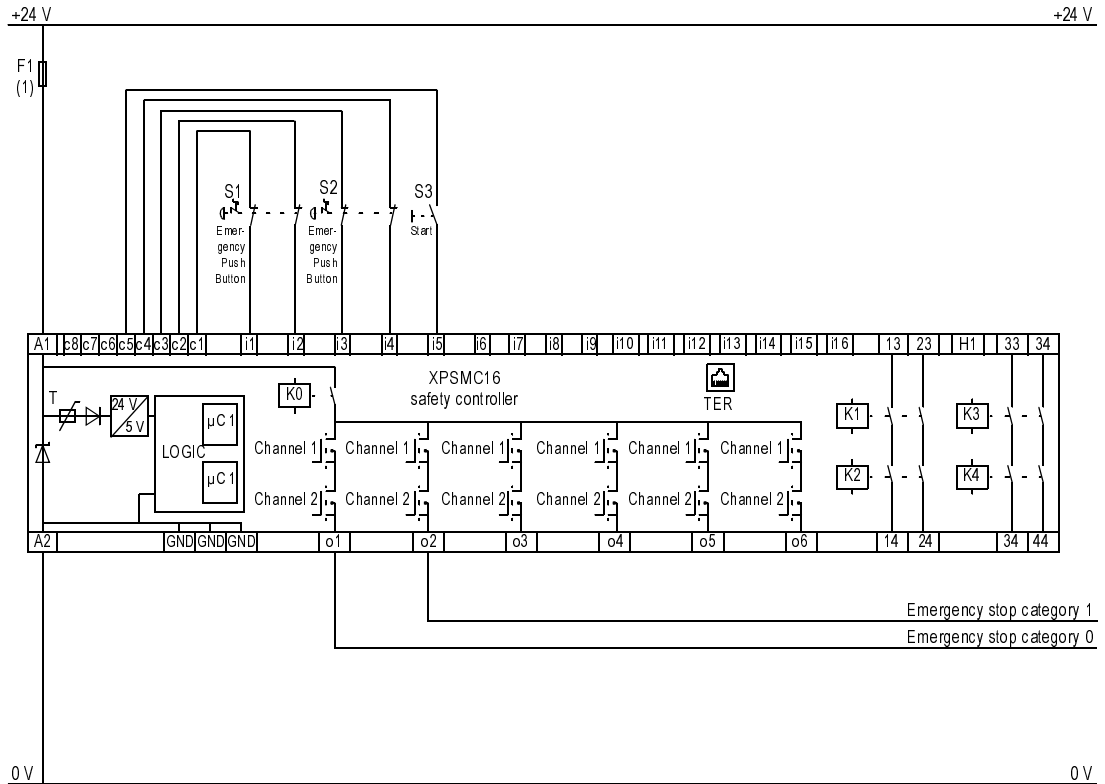
### Functional Diagram

The following functional diagram shows two Two-Channel Emergency Stops and the relevant control outputs for Categories 0 and 1:



**Wiring Diagram**

The following wiring diagram shows two Two-Channel Emergency Stops and the relevant control outputs for the Categories 0 and 1:

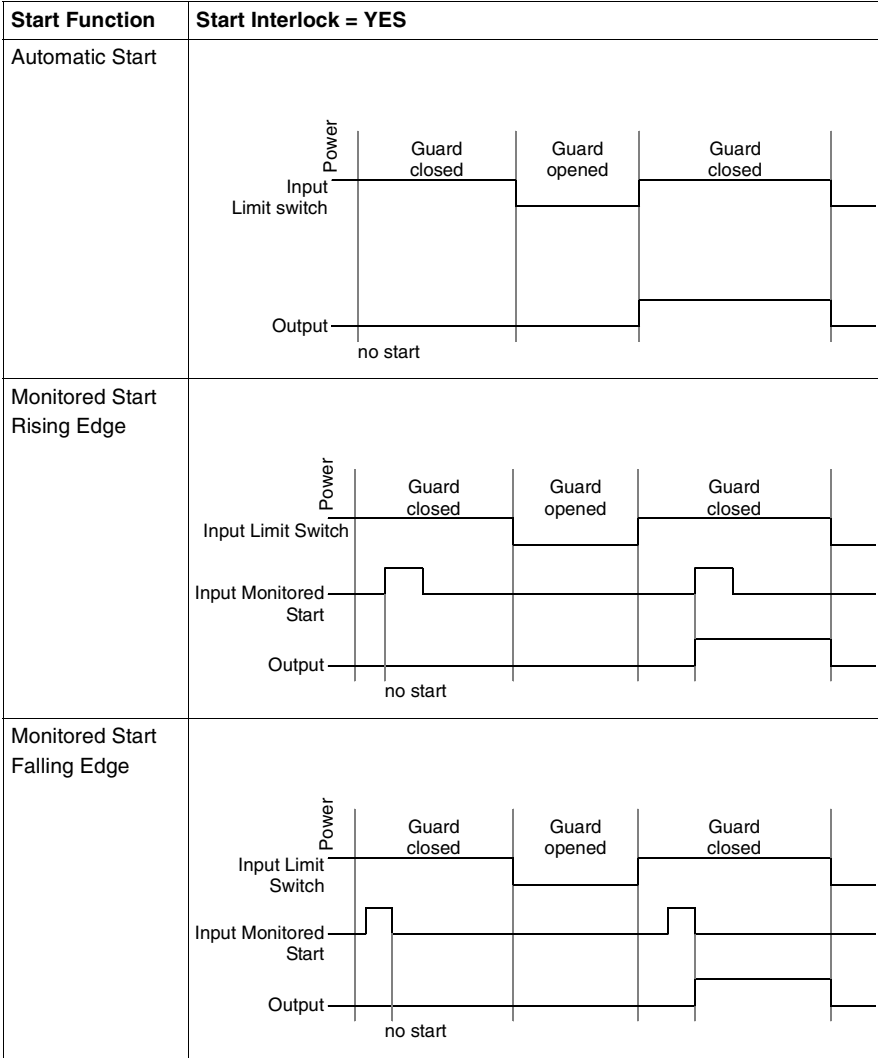


(1) See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.  
The static outputs are rated category 4 according to EN954-1.

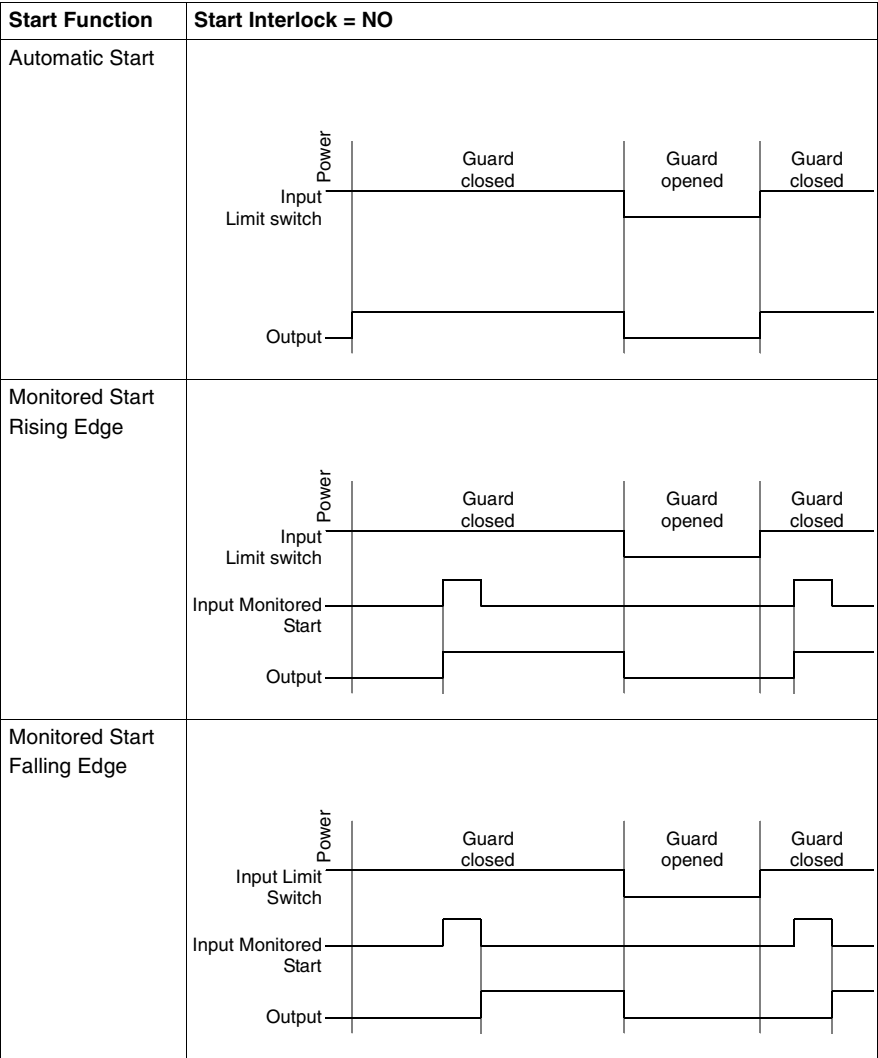
# Safety Guard with One Channel

## Functional Diagram

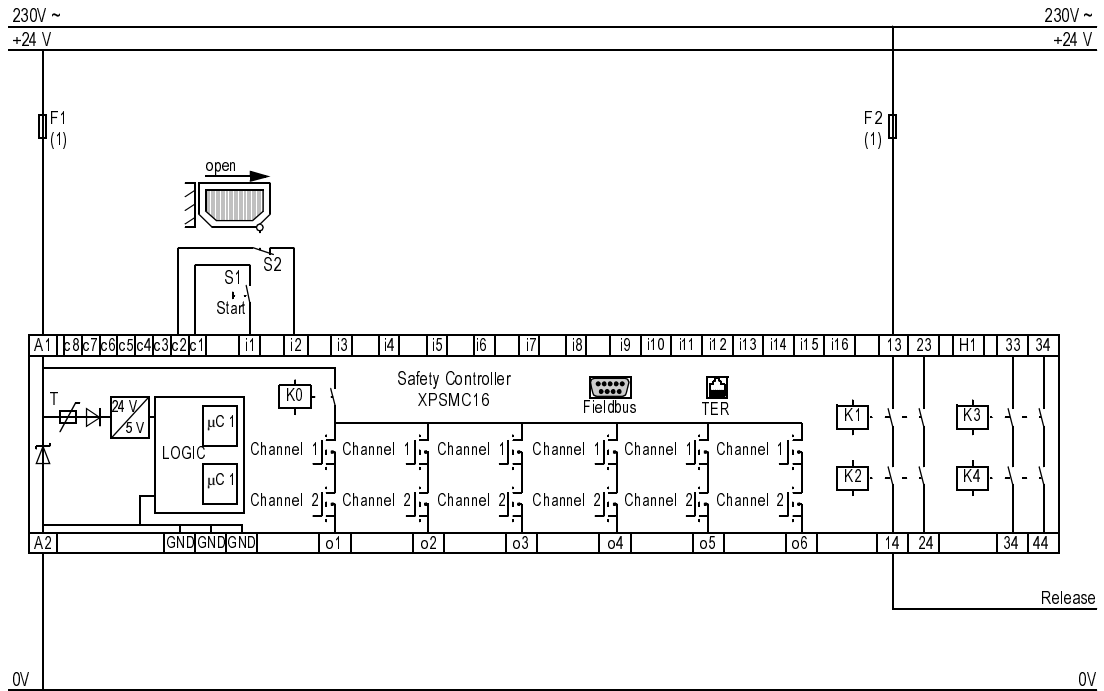
The following functional diagram shows the Safety Guard with One Channel with Start Interlock and different Start Functions:



The following functional diagram shows the Safety Guard with One Channel without Start Interlock and different Start Functions:



**Wiring Diagram** The following wiring diagram shows the Safety Guard with One Channel with and without Start Interlock and different Start Functions:

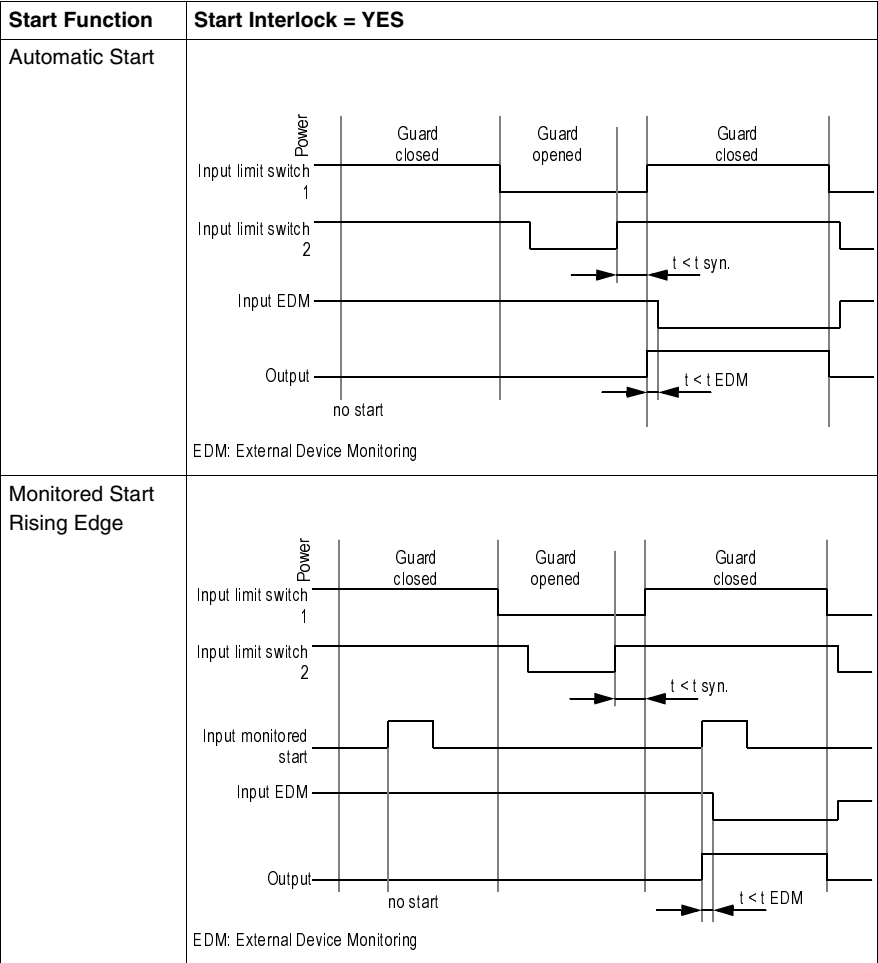


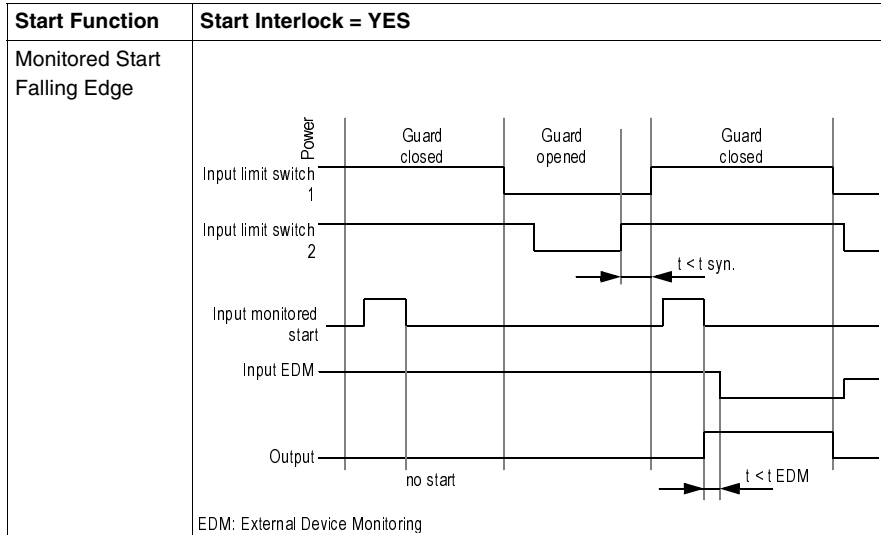
**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes. The static outputs are rated category 4 according to EN954-1.

Two Channel Safety Guard

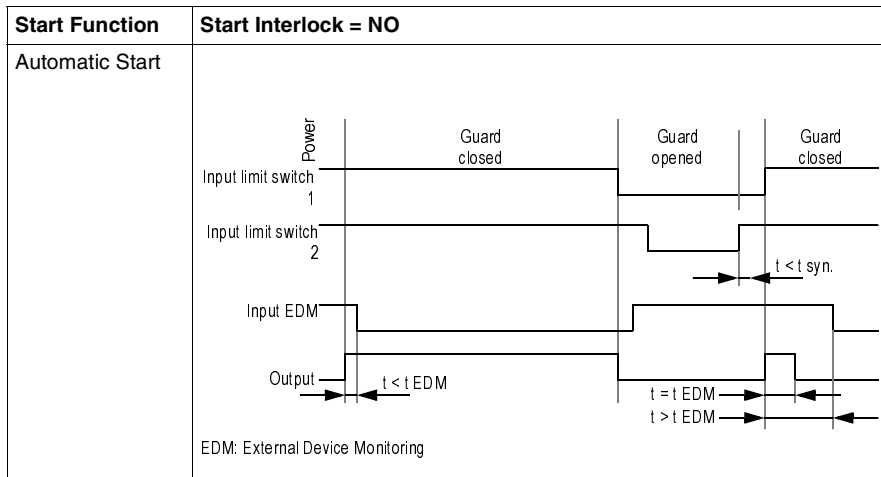
Functional Diagram

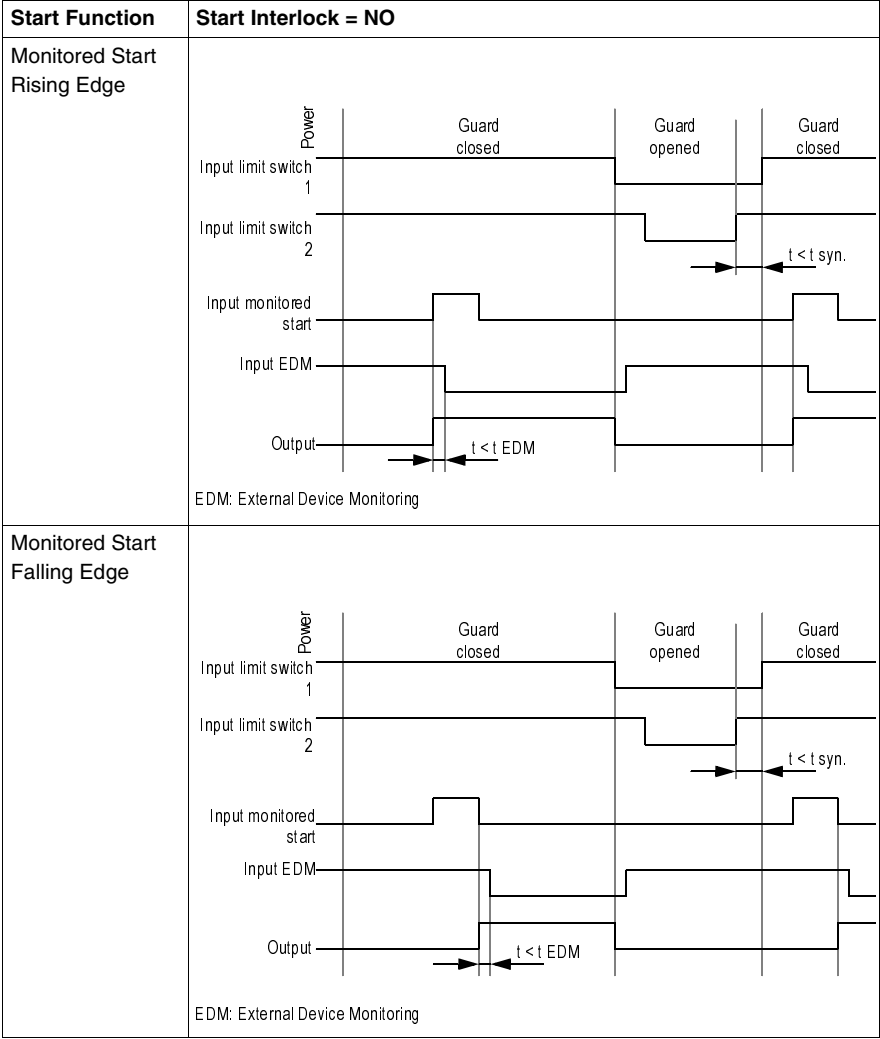
The following functional diagram shows the Two-Channel Safety Guard with Start Interlock and different Start Functions:





The following functional diagram shows the Two-Channel Safety Guard without Start Interlock and different Start Functions:

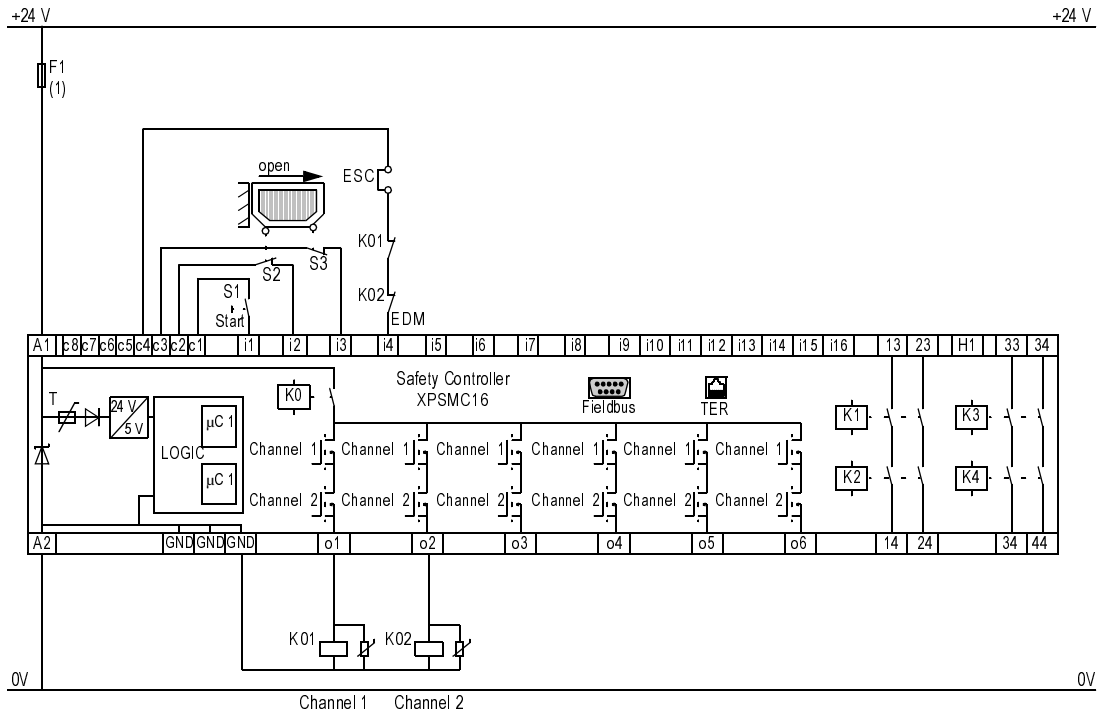






## Wiring Diagram

The following wiring diagram shows the Two-Channel Safety Guard with and without Start Interlock and different Start Functions:



### ESC External Start Conditions

## EDM External Device Monitoring

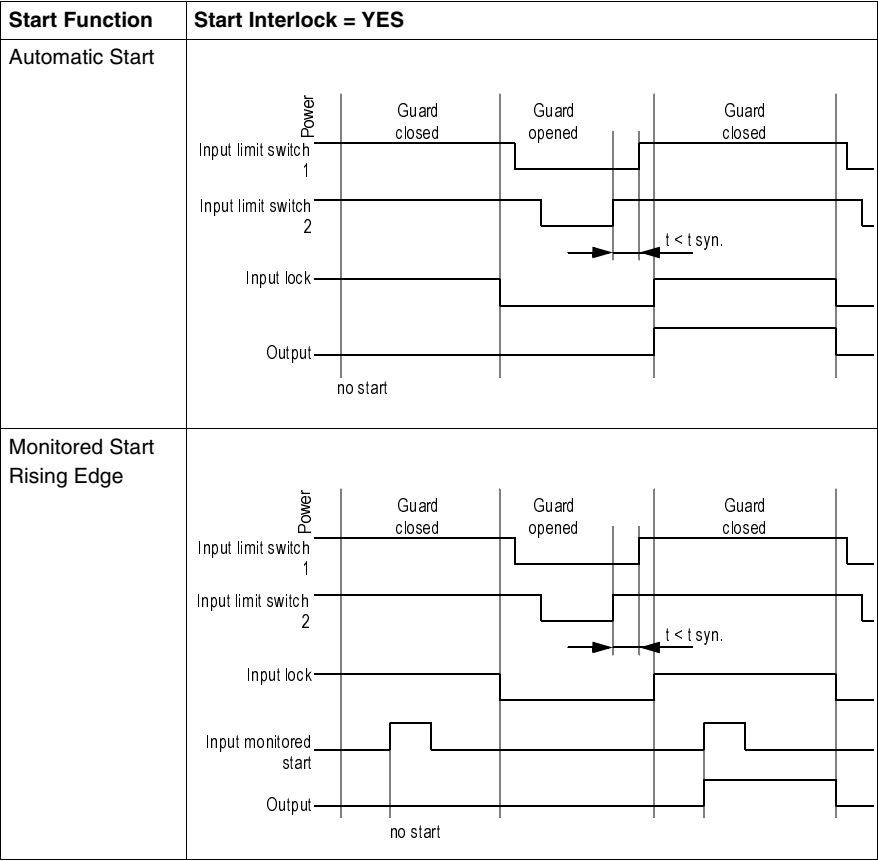
(1) See Technical Data in XPSMC Safety Controller Hardware manual for maximum fuse size

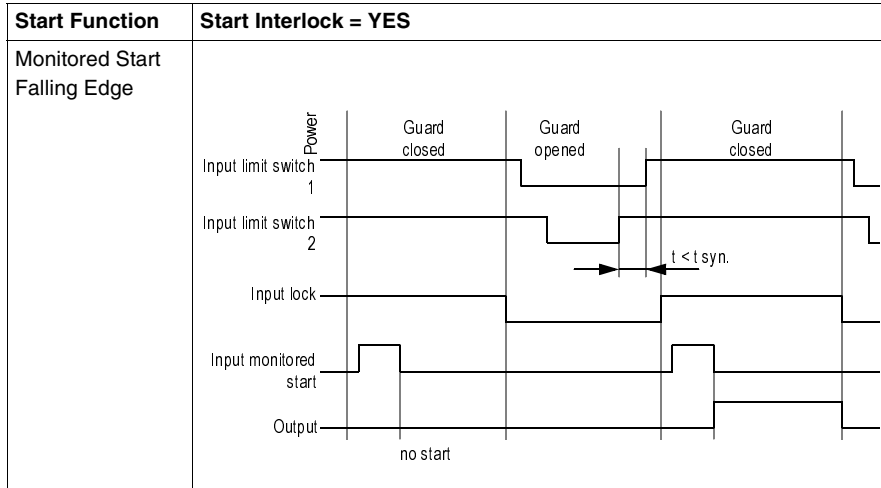
The static outputs are rated category 4 according to EN954-1.

## Two Channels Safety Guard with Lock

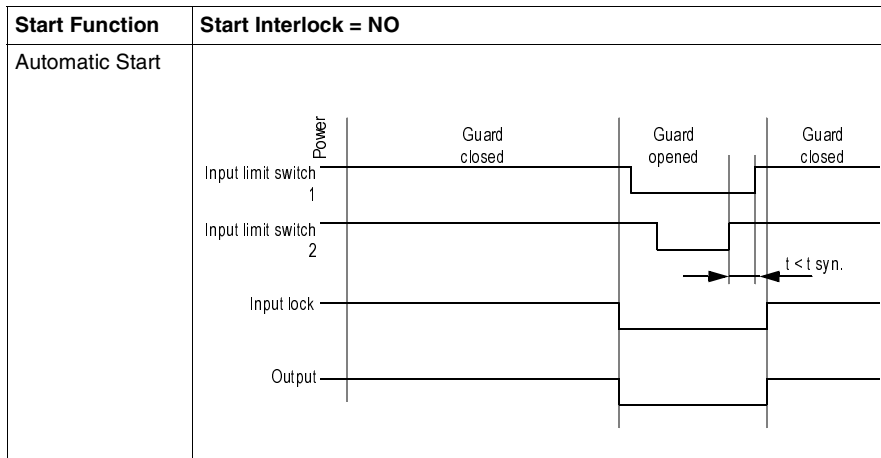
**Functional  
Diagram**

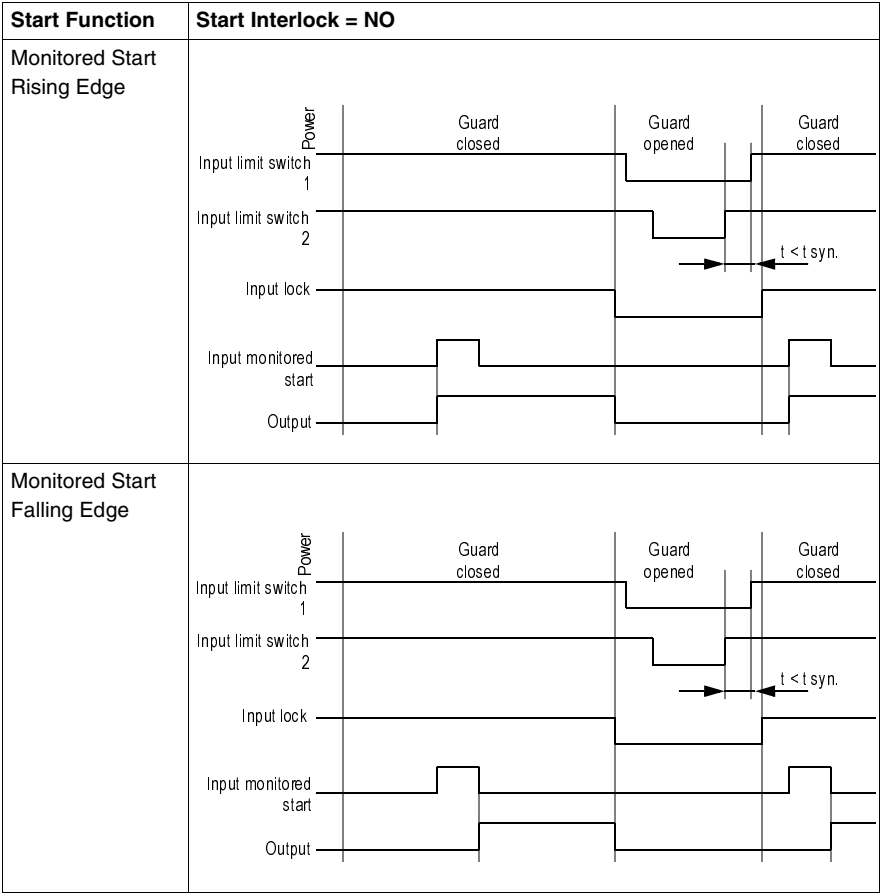
The following functional diagram shows the Two-Channel Safety Guard with Lock and with Start Interlock and different Start Functions:





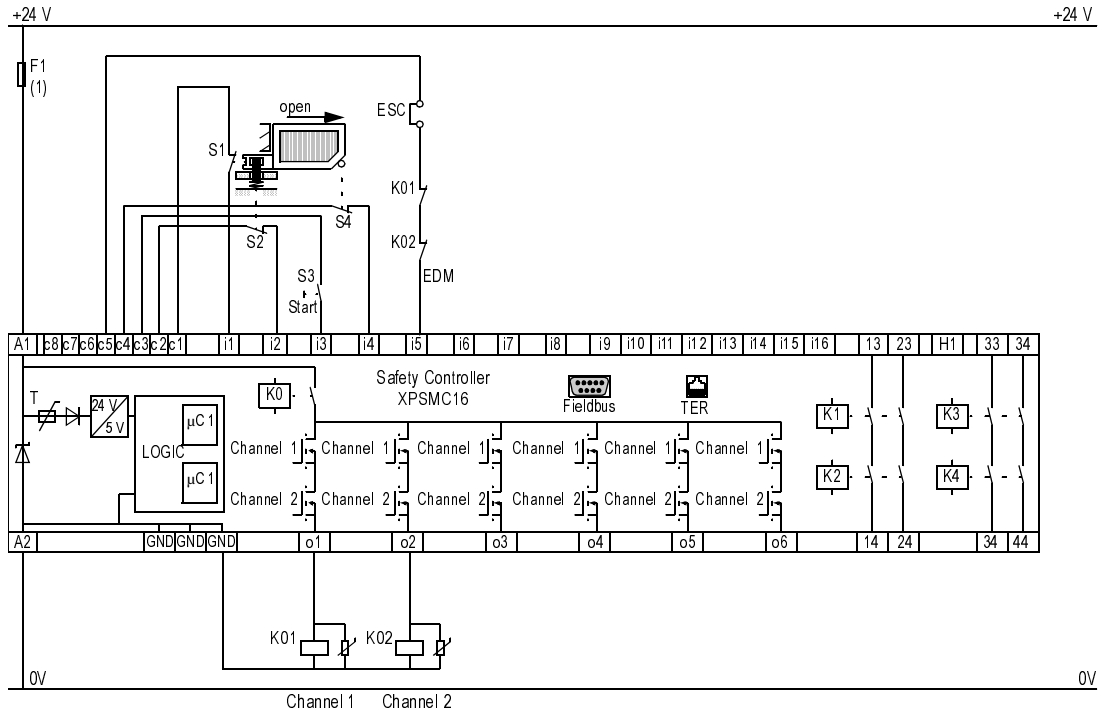
The following functional diagram shows the Two-Channel Safety Guard with Lock and without Start Interlock and different Start Functions:





**Wiring Diagram**

The following wiring diagram shows the Two-Channel Safety Guard with Lock and with and without Start Interlock and different Start Functions:



**ESC** External Start Conditions

**EDM** External Device Monitoring

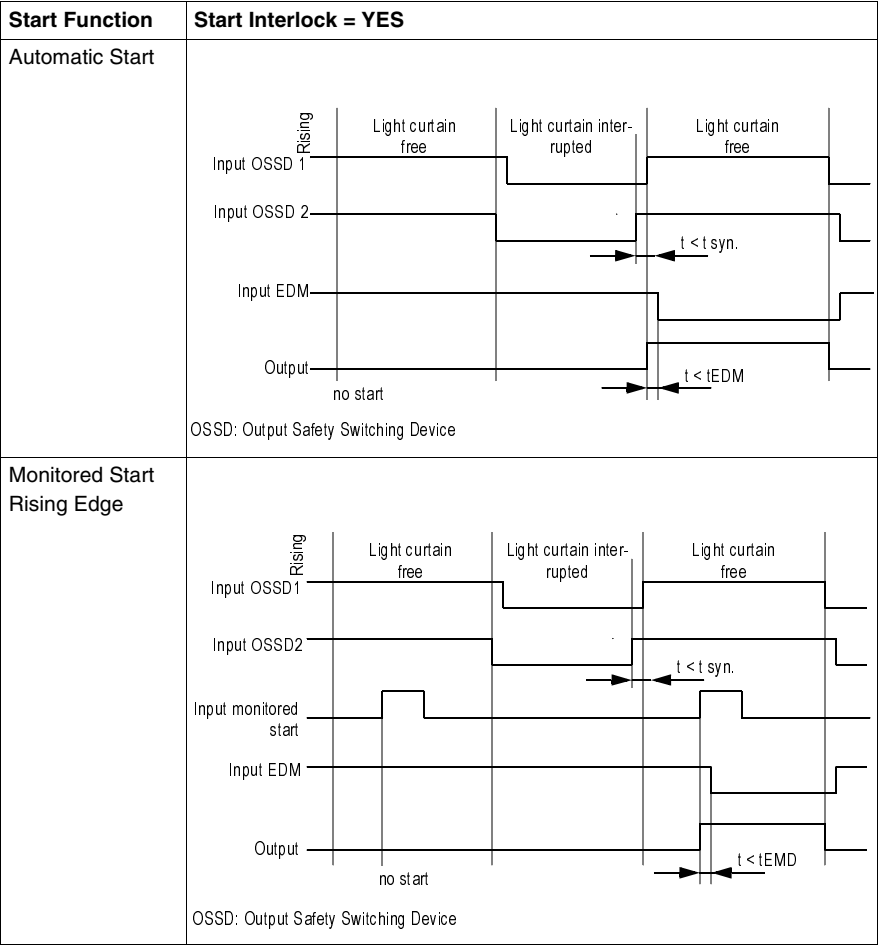
**(1)** See Technical Data in XPSMC Safety Controller Hardware manual form maximum fuse size

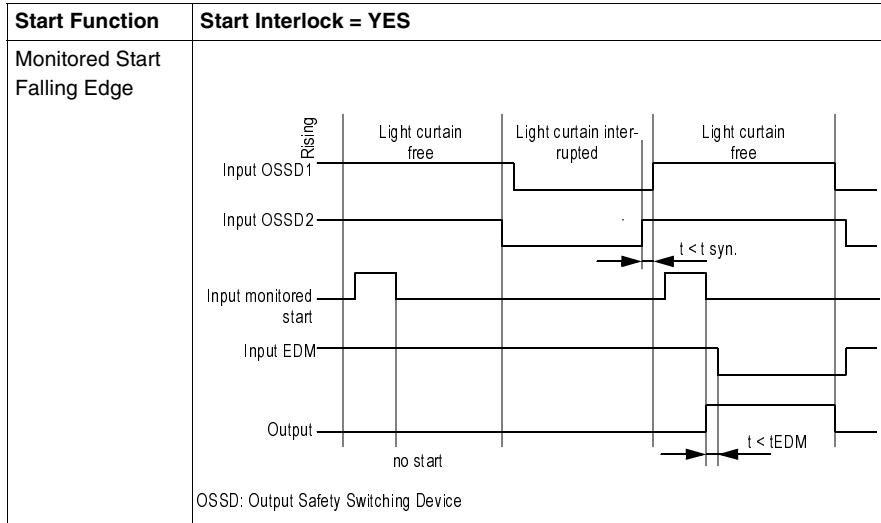
The static outputs are rated category 4 according to EN954-1.

Light Curtain with Relay Outputs

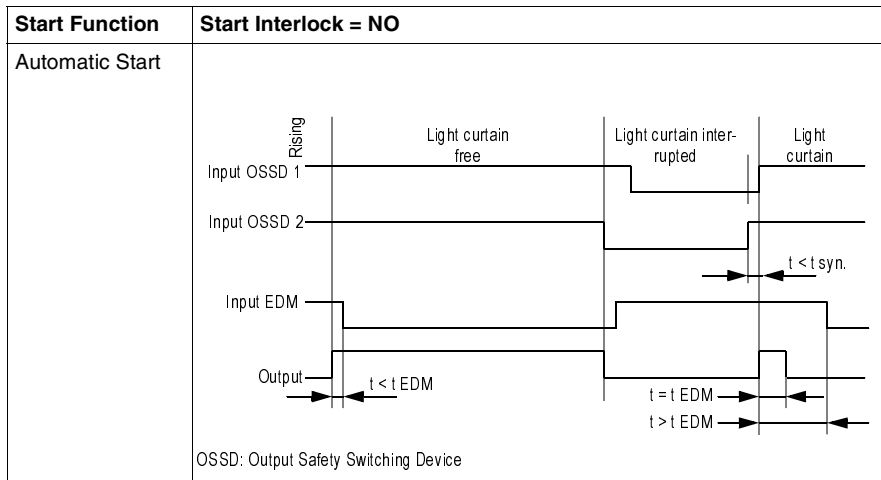
Functional Diagram

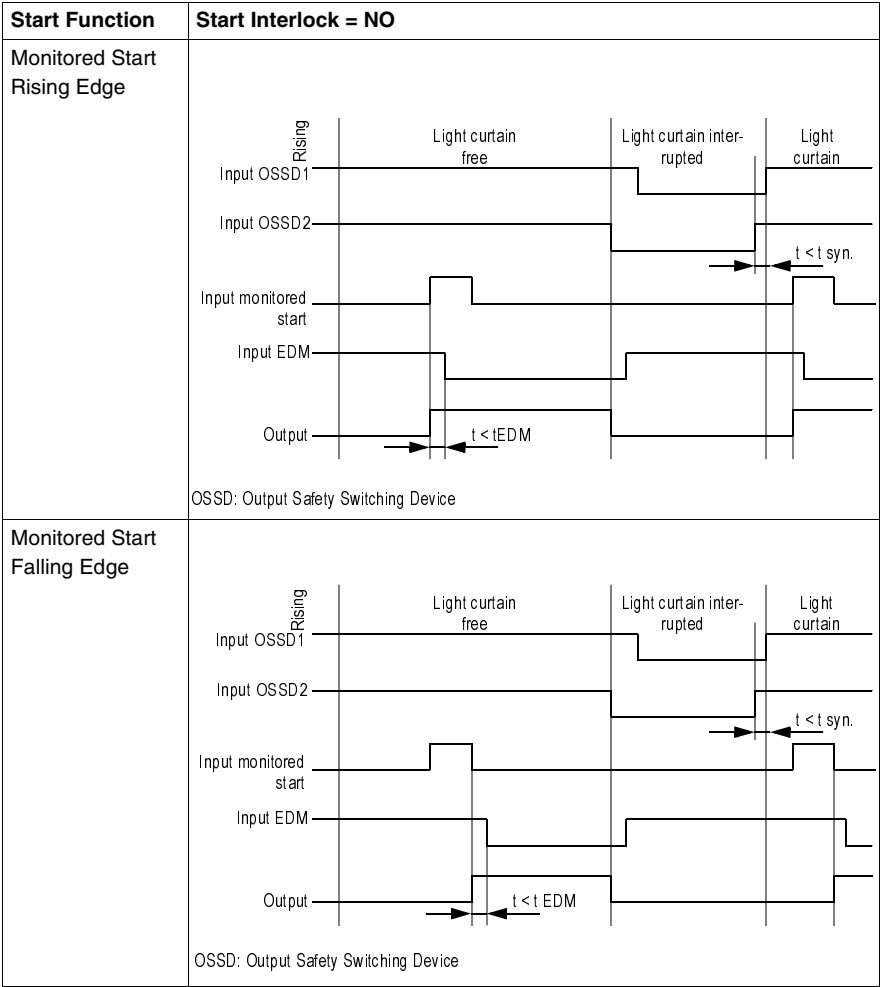
The following functional diagram shows the Light Curtain with Relay Outputs with Start Interlock and different Start Functions:





The following functional diagram shows the Light Curtain with Relay Outputs without Start Interlock and different Start Functions:

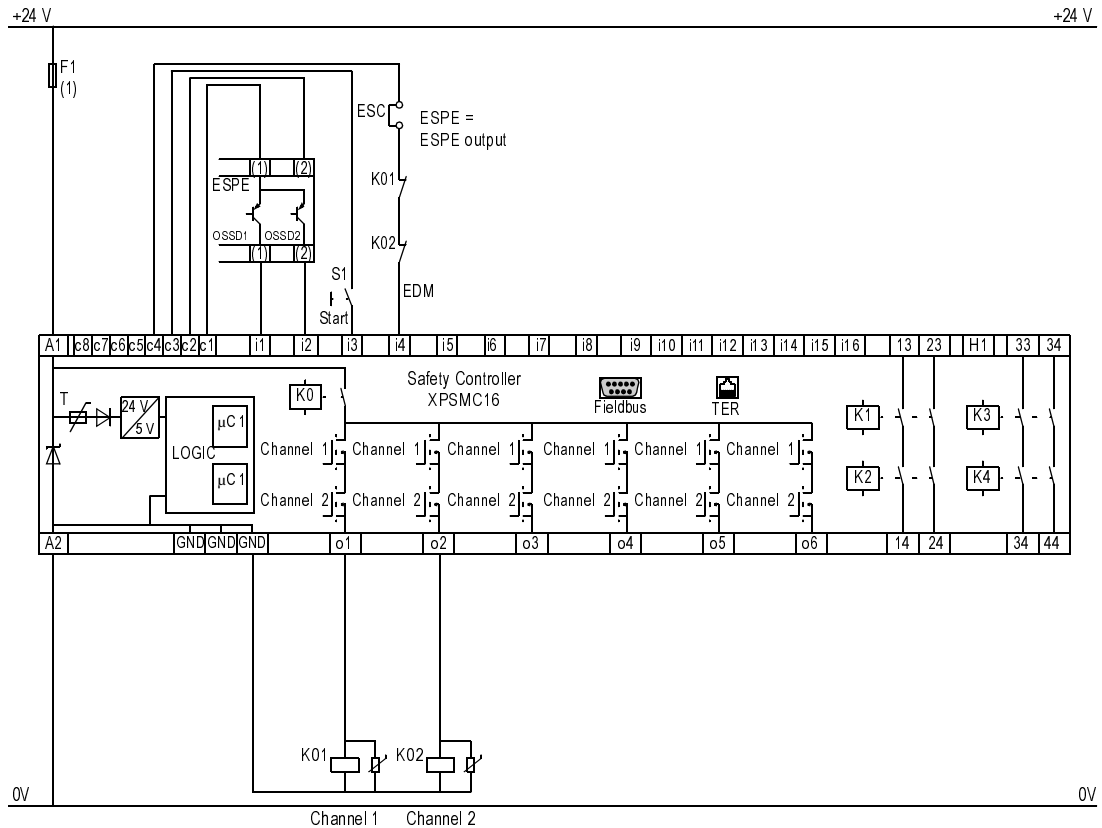






**Wiring Diagram**

The following wiring diagram shows the Light Curtain with Relay Outputs with and without Start Interlock and different Start Functions:



**ESC** External Start Conditions

**EDM** External Device Monitoring

**ESPE** Electro Sensitive Protective Equipment

**OSSD** Output Safety Switching Device

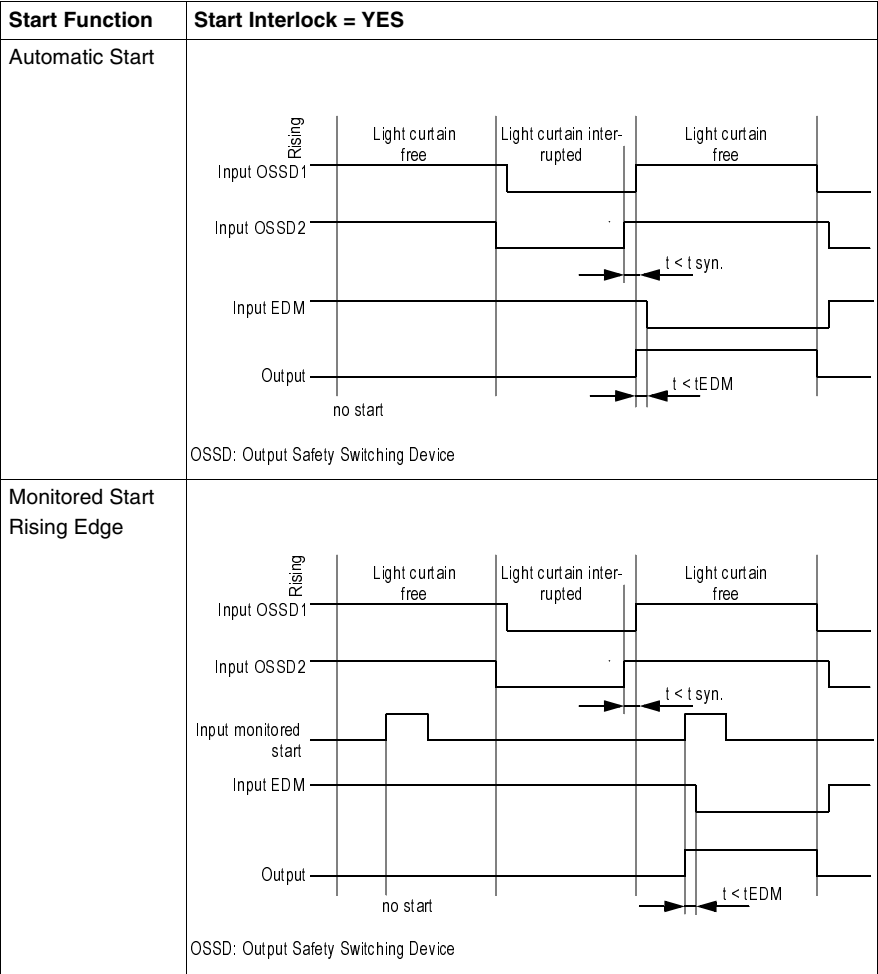
(1) See Technical Data in XPSMC Safety Controller Hardware manual for maximum fuse size

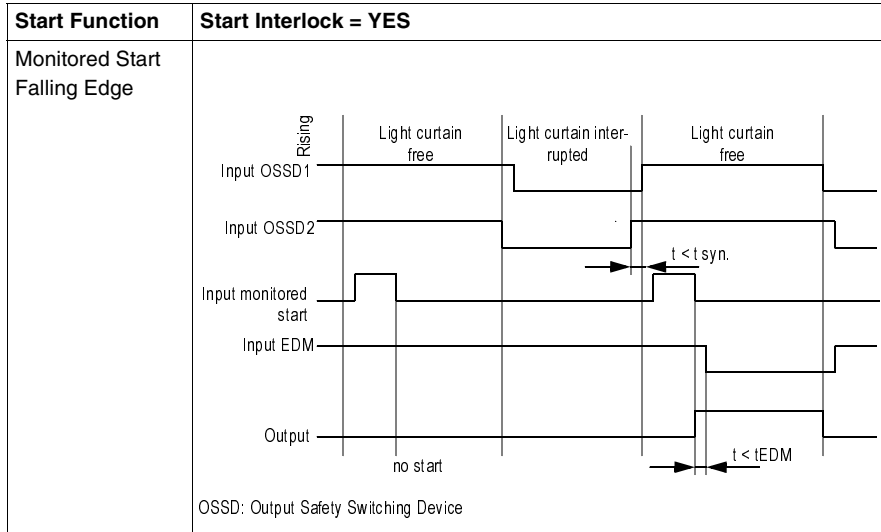
The static outputs are rated category 4 according to EN954-1.

Light Curtain with Transistor Outputs

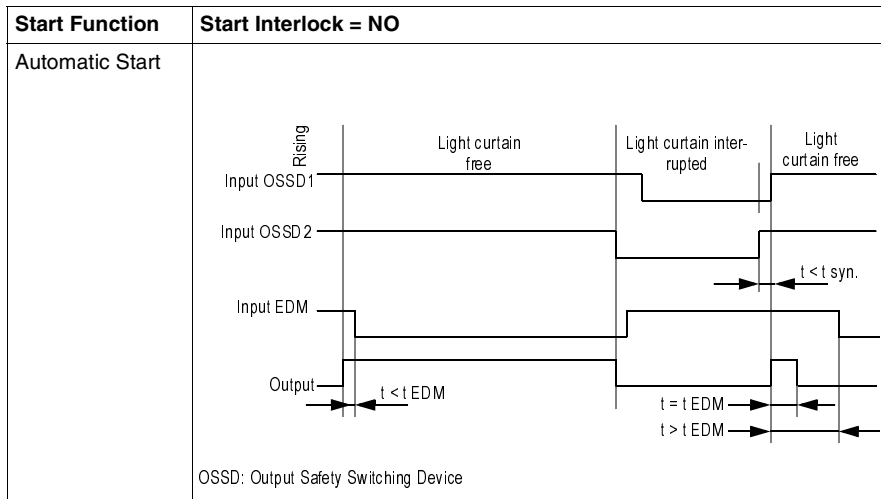
Functional Diagram

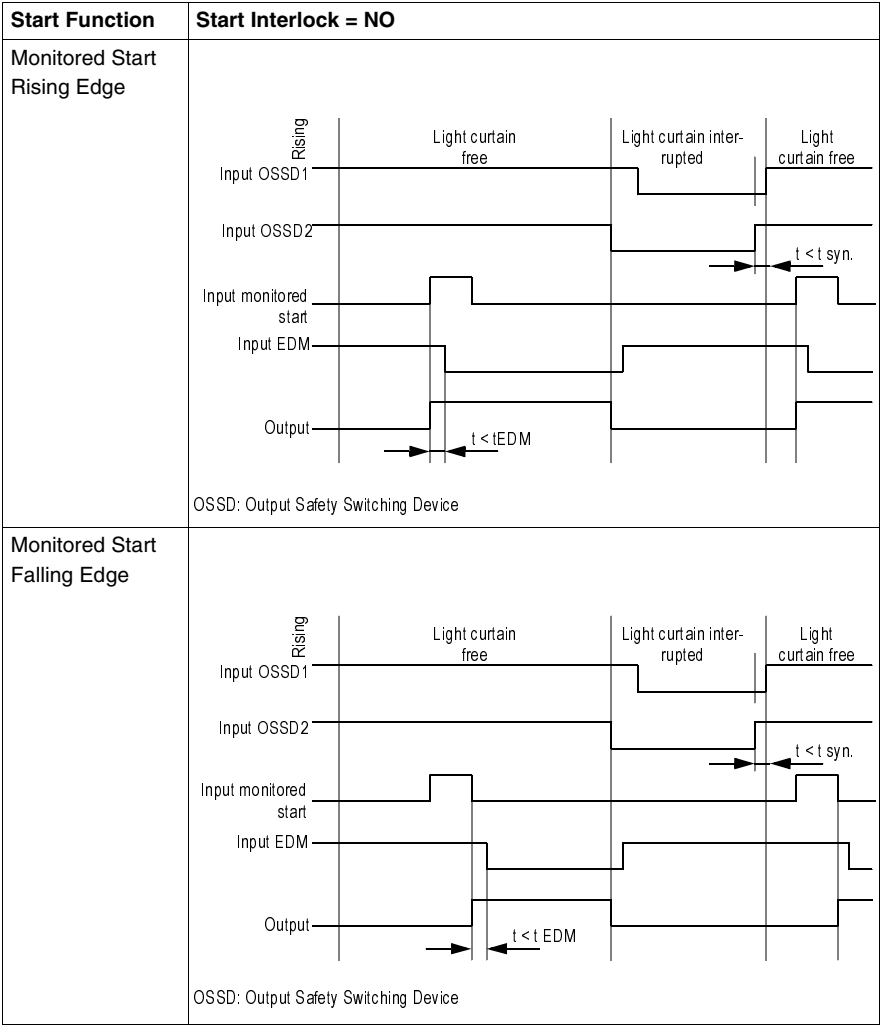
The following functional diagram shows the Light Curtain with Transistor Outputs with Start Interlock and different Start Functions:





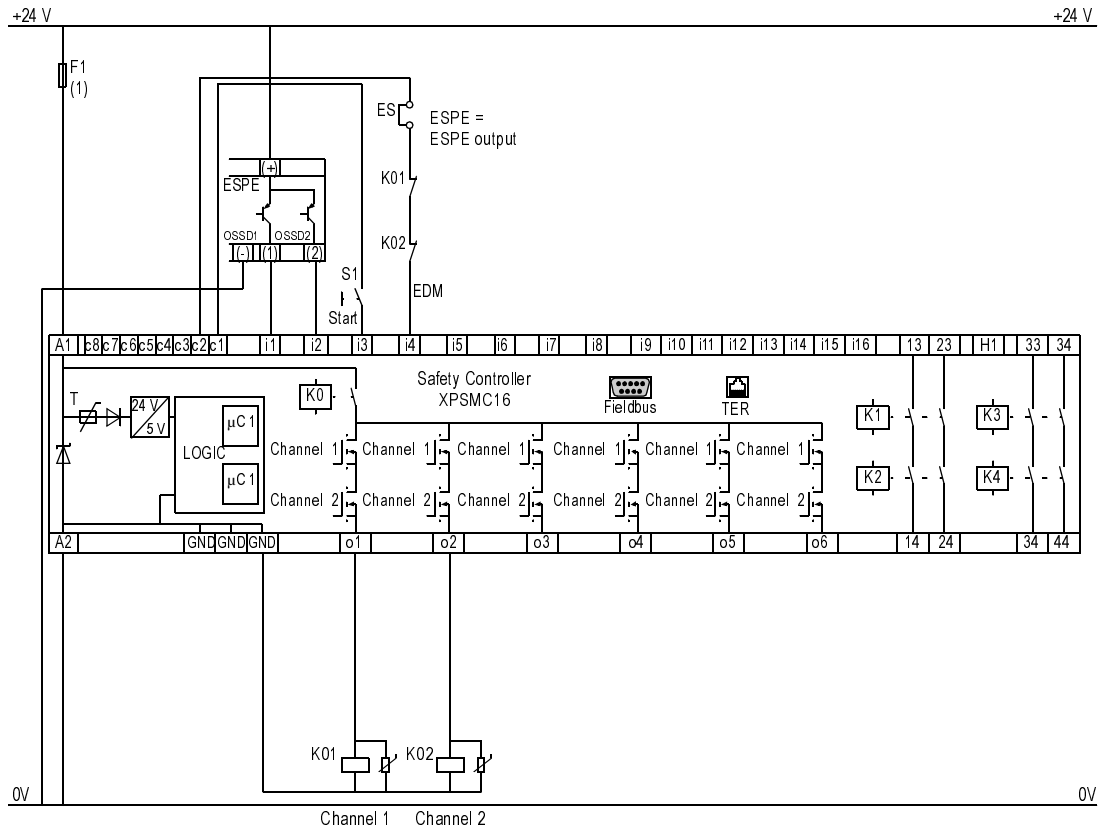
The following functional diagram shows the Light Curtain with Transistor Outputs without Start Interlock and different Start Functions:





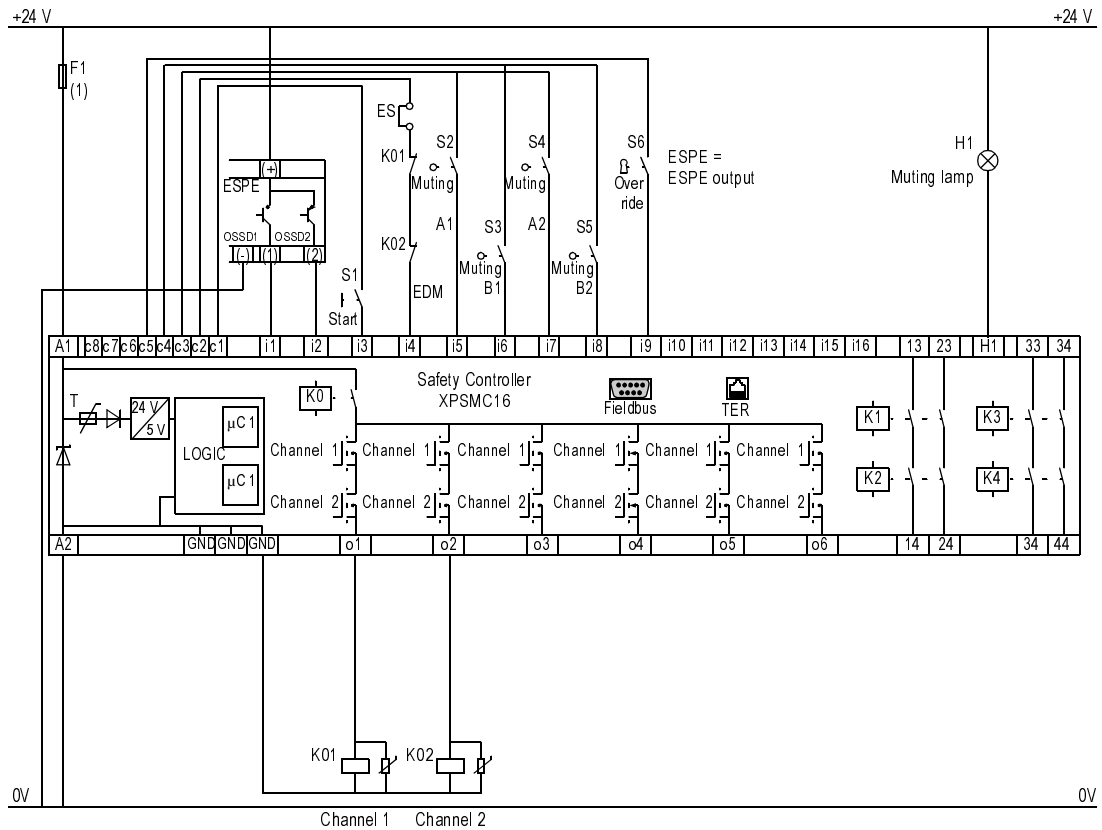
**Wiring Diagram**

The following wiring diagram shows the Light Curtain with Transistor Outputs with and without Start Interlock and different Start Functions





**Wiring Diagram** The following wiring diagram shows the Muting for light curtains type 4:



**ESC** External Start Conditions

**EDM** External Device Monitoring

**ESPE** Electro Sensitive Protective Equipment

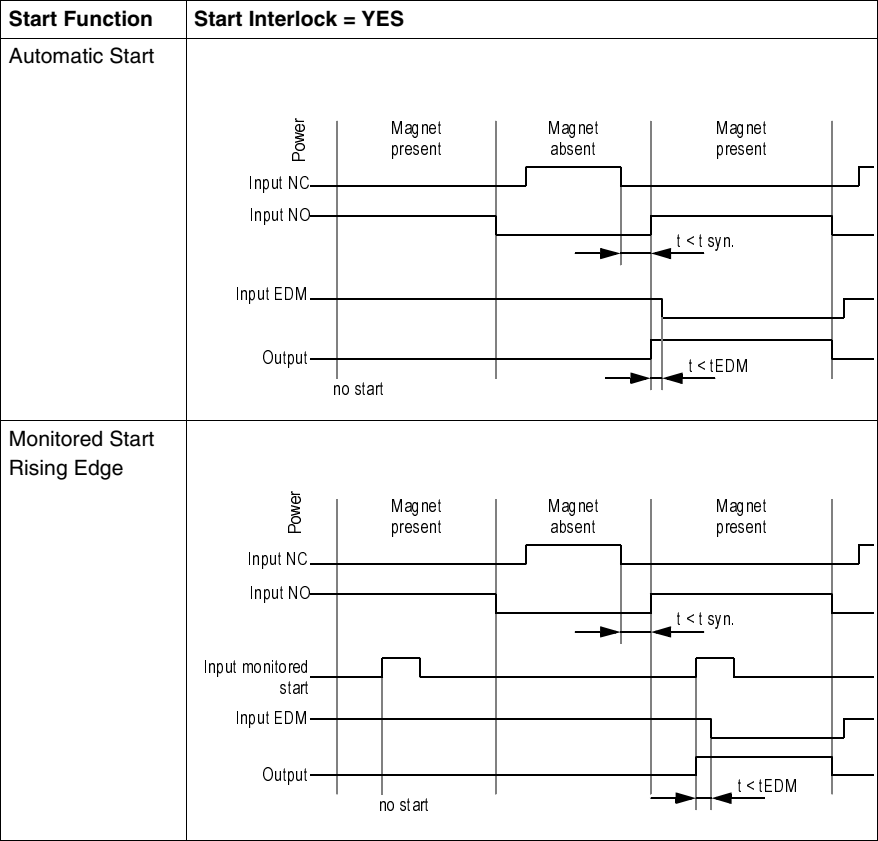
**(1)** See Technical Data in XPSMC Safety Controller Hardware manual for maximum fuse size

The static outputs are rated category 4 according to EN954-1.

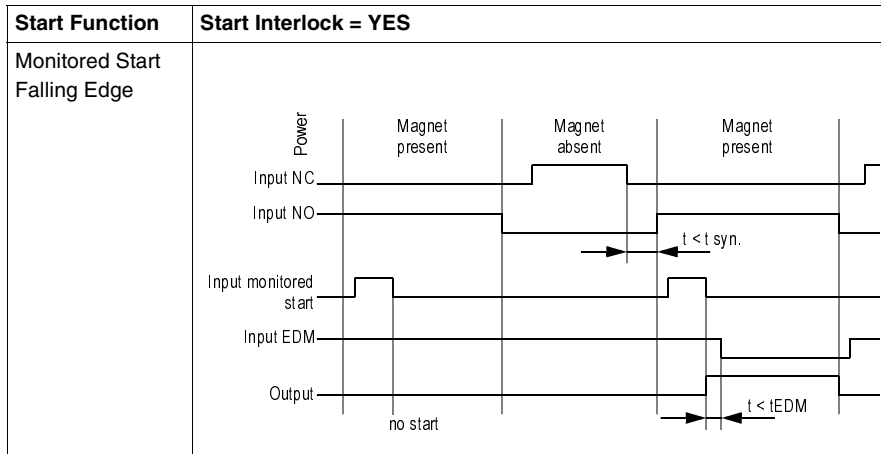
Magnetic Switch

Functional Diagram

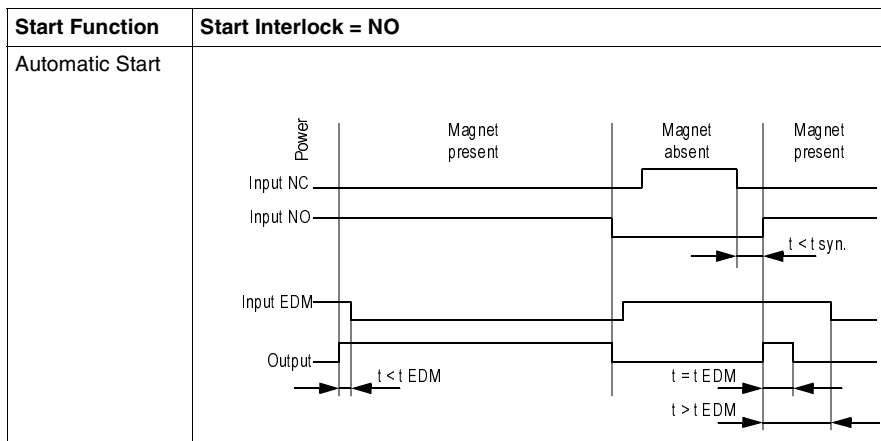
The following functional diagram shows the Magnetic Switch with Interlock and different Start Functions:

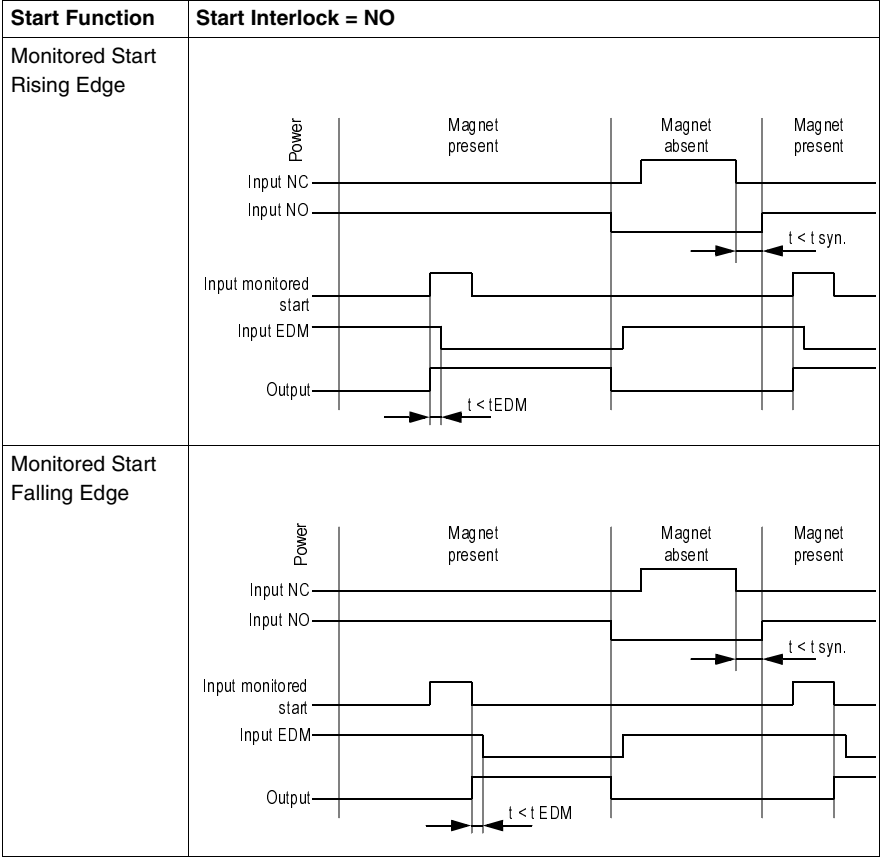






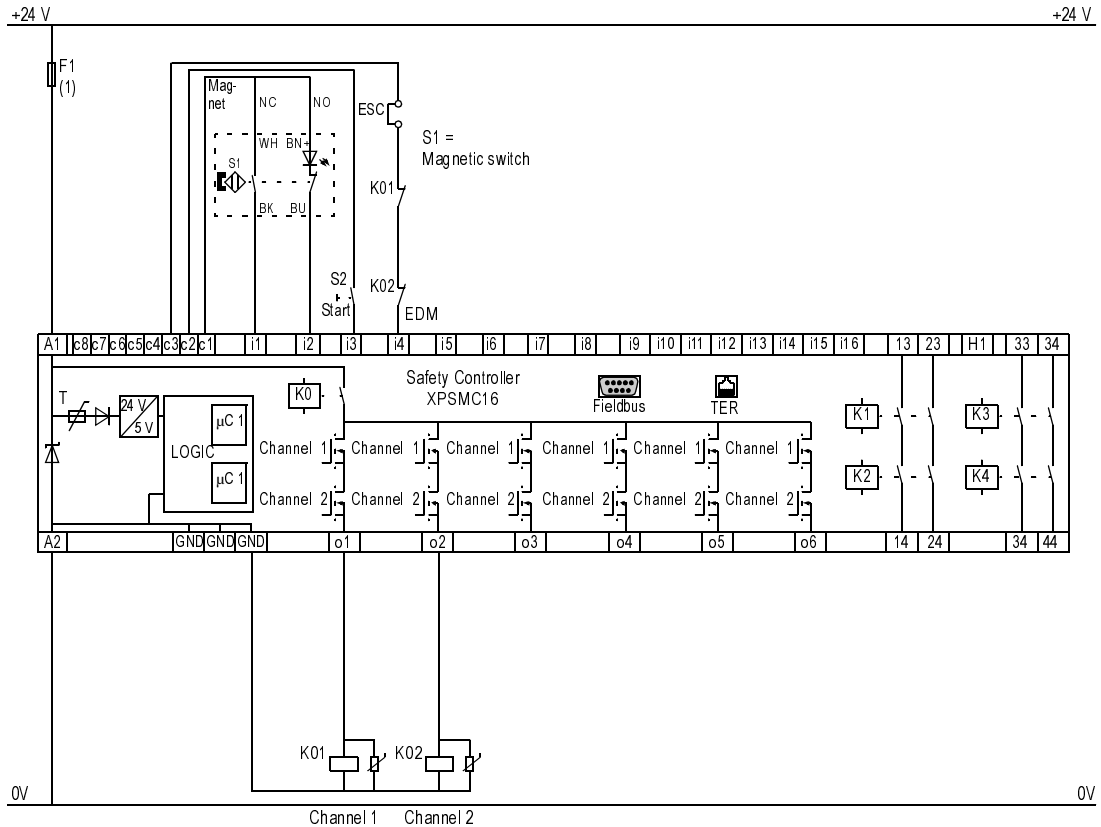
The following functional diagram shows the Magnetic Switch without Interlock and different Start Functions:





## Wiring Diagram

The following wiring diagram shows the Magnetic Switch with and without Interlock and different Start Functions



### ESC External Start Conditions

## EDM External Device Monitoring

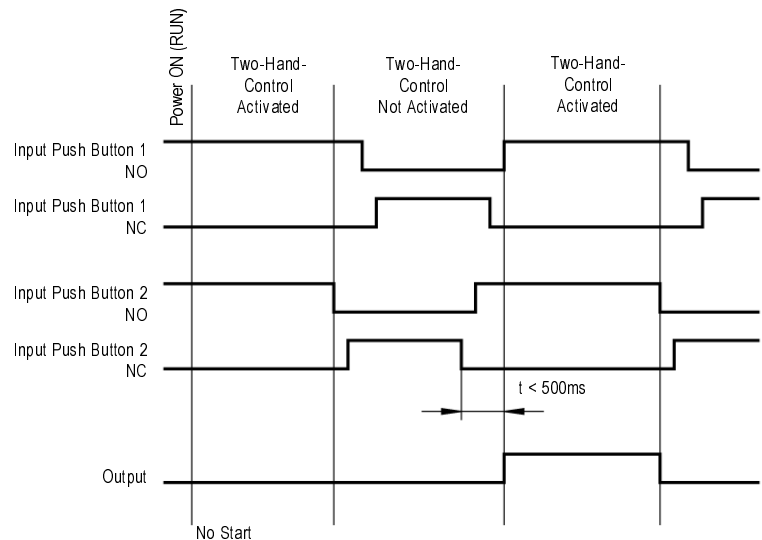
(1) See Technical Data in XPSMC Safety Controller Hardware manual for maximum fuse size

The static outputs are rated category 4 according to EN954-1.

# Two-Hand Control

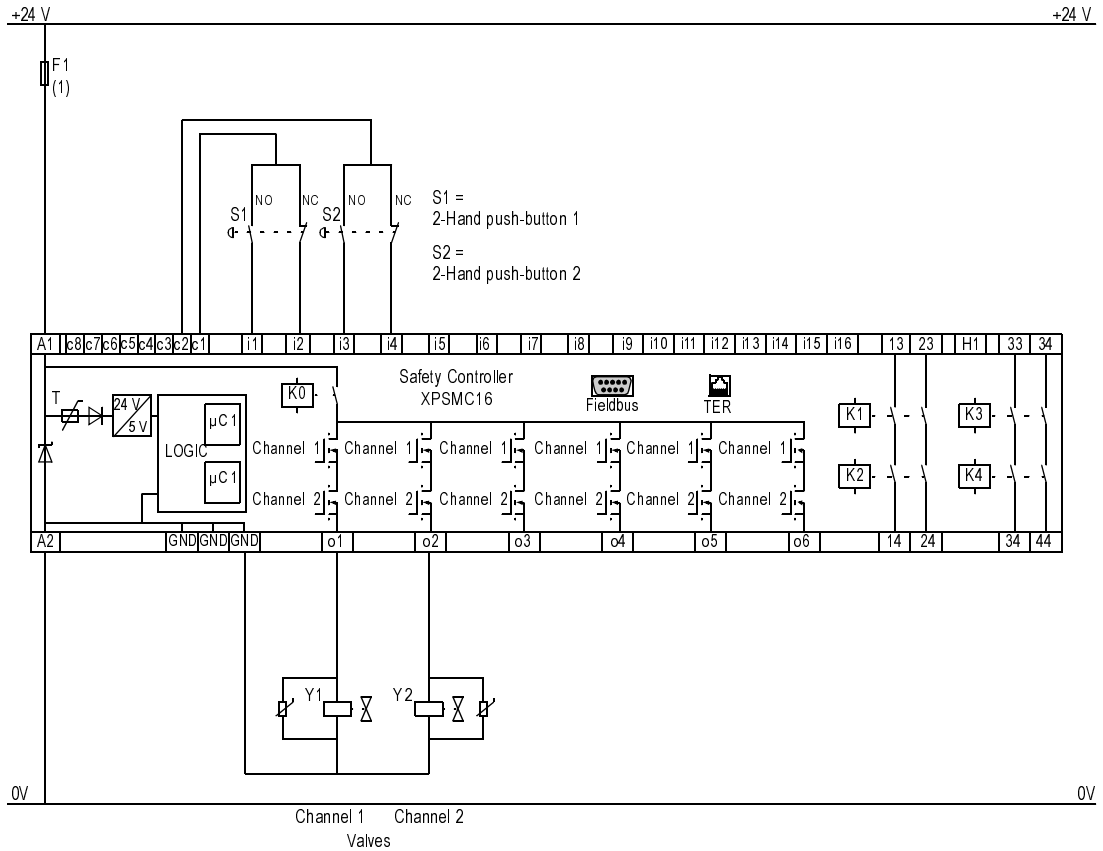
## Functional Diagram

The following functional diagram shows the Two-Hand Control device:



## Wiring Diagram

The following wiring diagram shows the Two-Hand Control device:

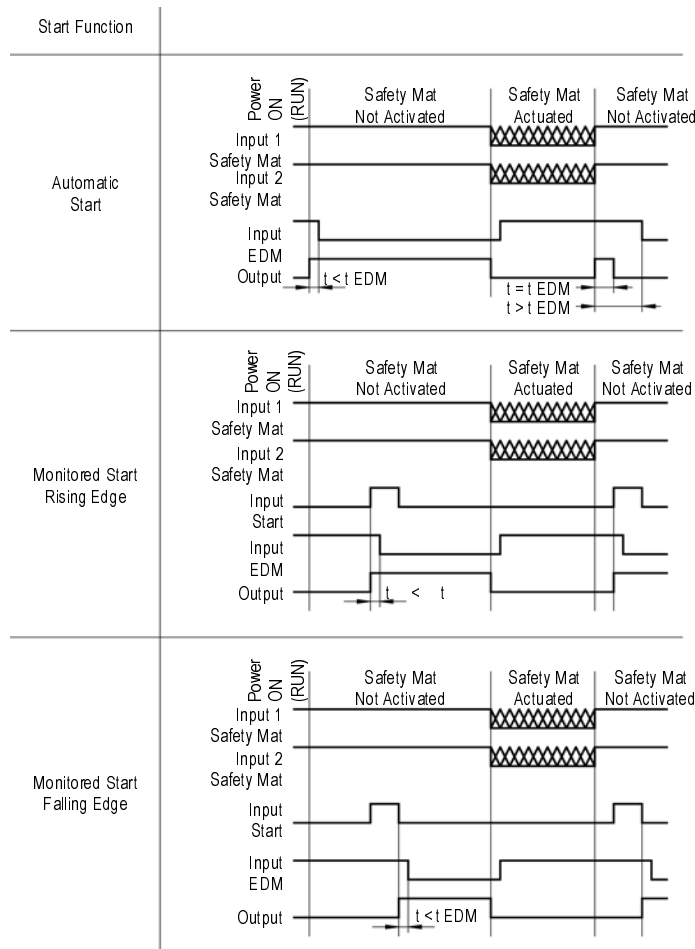


**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes. The static outputs are rated category 4 according to EN954-1.

# Safety Mat

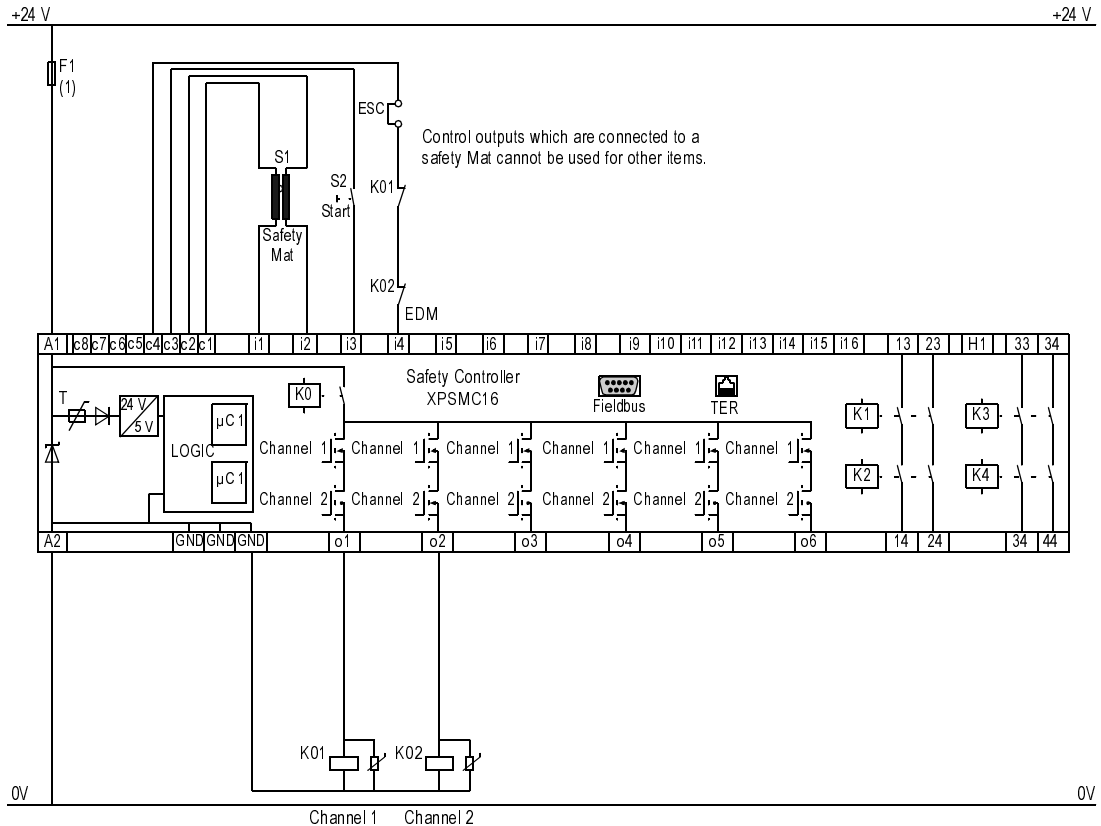
## Functional Diagram

The following functional diagram shows the Safety Mat:



## Wiring Diagram

The following wiring diagram shows the Safety Mat:



### ESC External Start Conditions

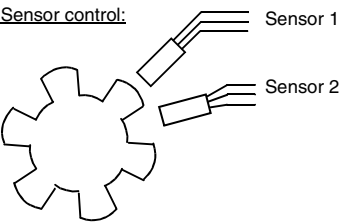
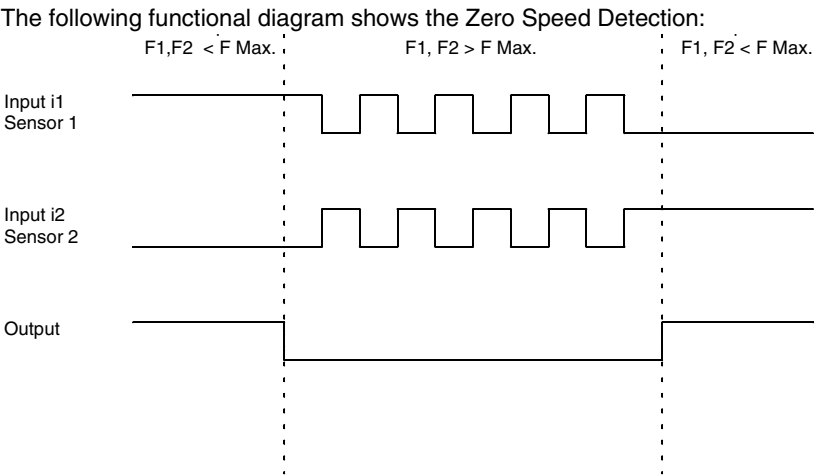
## EDM External Device Monitoring

(1) See Technical Data in XPSMC Safety Controller Hardware manual for maximum fuse size

The static outputs are rated category 4 according to EN954-1.

# Zero Speed Detection

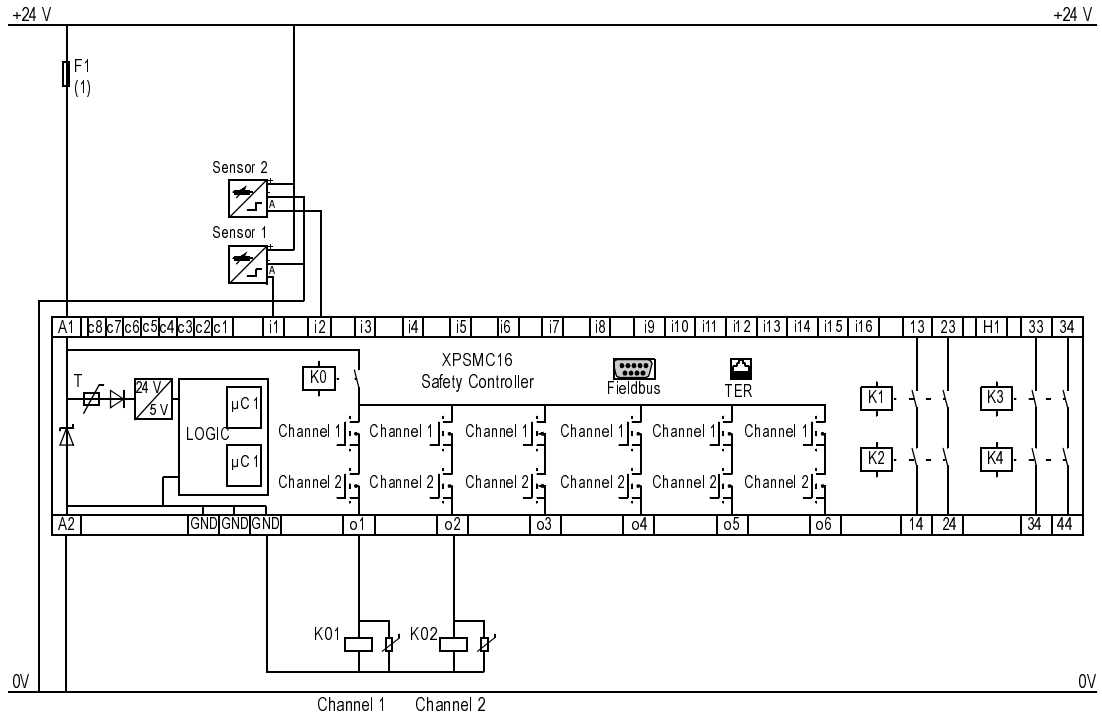
## Functional Diagram



**Note:** It is vital to use inputs i1 and i2 for zero speed detection. The two sensors must be arranged so that only one sensor is activated at any given time. If the inputs are in the low state, the zero speed signal will disappear after  $t=1/f$  seconds and an open-circuit will be indicated. If the 2 inputs are in the high state, the zero speed signal will disappear after  $t=1/f$  seconds and a short-circuit will be indicated. If the 2 inputs are in the high or low state after starting, no enabling will take place.



# **Wiring Diagram**     The following wiring diagram shows the Zero Speed Detection:



**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes. The static outputs are rated category 4 according to EN954-1.

**Important Key  
Points to  
Observe**

The following points should be observed for the correct operation of the zero speed detection:

- The sensors must be arranged so that only 1 sensor is activated at any given time (= HIGH-Signal).
- If both sensors are in the LOW state, a cable break error message is indicated and the corresponding outputs are deactivated.
- If both sensors are in the HIGH state after power on of the XPSMC, a notification is available via Modbus RTU, or via the configuration terminal (PC), and the corresponding outputs are deactivated. After a zero speed detection and a subsequent motion the notification is reset.
- If zero speed is already detected and both sensors are in HIGH state, a notification is available via Modbus RTU, or via the configuration terminal (PC), and the corresponding outputs are activated.
- If only 1 sensor produces a dynamic signal after a zero speed, an error message appears after 30 s and the corresponding outputs are deactivated.
- If, after the XPSMC has started, both sensors are in the LOW state, an error message is available via the Error LED on the XPSMC and Modbus RTU, or via the configuration terminal (PC).

**Note:** You cannot use the Zero Speed Detection device simultaneously with the Shift/Chain Break Monitoring device on the XPSMC safety controller, because there are only two counter inputs (**i1** and **i2**) per controller.

**Note:** The output will be activated if the sensors detect no motion.

---

**Sensor States and Behavior**

## Switch-on Sequence

<b>State of Sensor 1</b>	0	0 (*)	1
<b>State of Sensor 2</b>	0	1 (*)	1
<b>Behavior</b>	Error Message	Zero Speed	Notification (**)
<b>Output</b>	0	1	0

## Operation

<b>State of Sensor 1</b>	0	0 (*)	1
<b>State of Sensor 2</b>	0	1 (*)	1
<b>Behavior</b>	Error Message	Zero Speed	Notification
<b>Output</b>	0	1	1

\* If the state of the sensors is inverse (0/1, 1/0), the behavior is identical.

\*\* If the firmware version is earlier than 2.34 an error message (short circuit between inputs) appears instead of a notification. This error message must be acknowledged with the reset button.

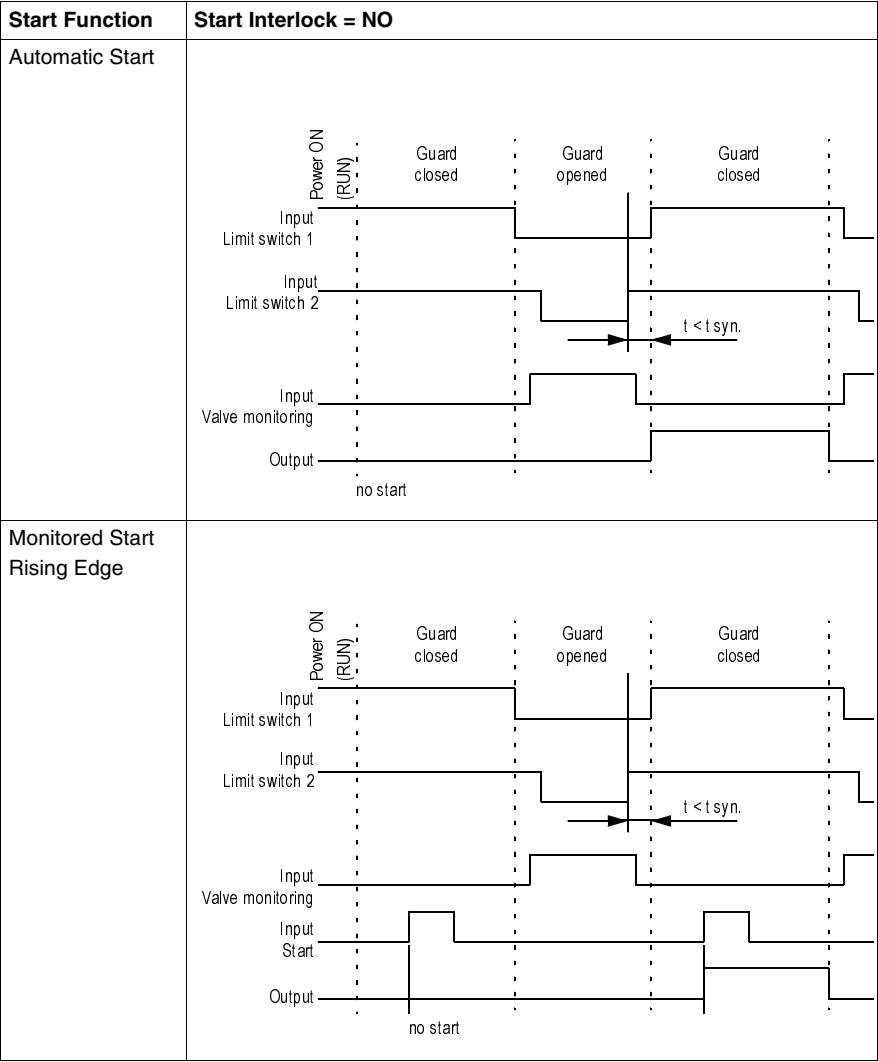
**Error Message** External error messages must be acknowledged with the reset button.

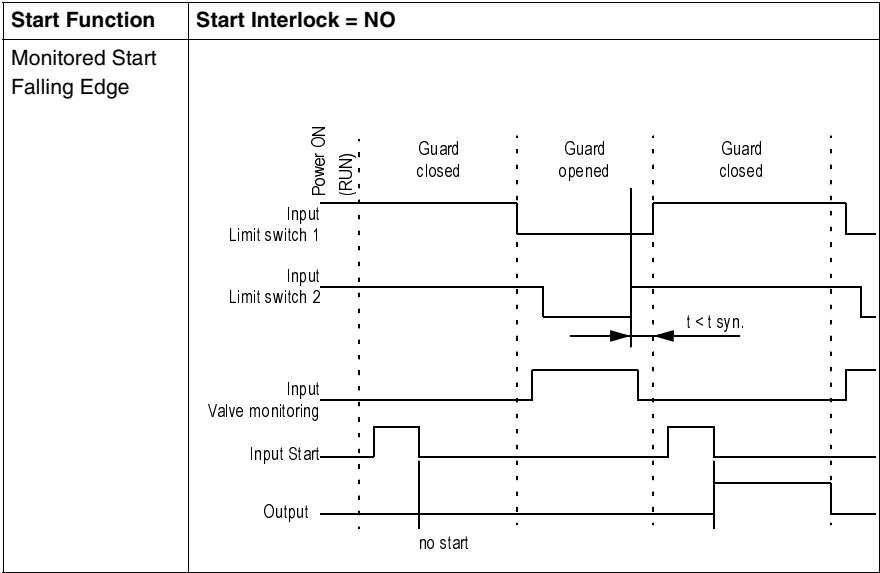
**Notification** A notification, sent via Modbus, does not need to be acknowledged. As soon as the sensor states change, it will be acknowledged automatically.

Injection Molding Machines

Functional Diagram

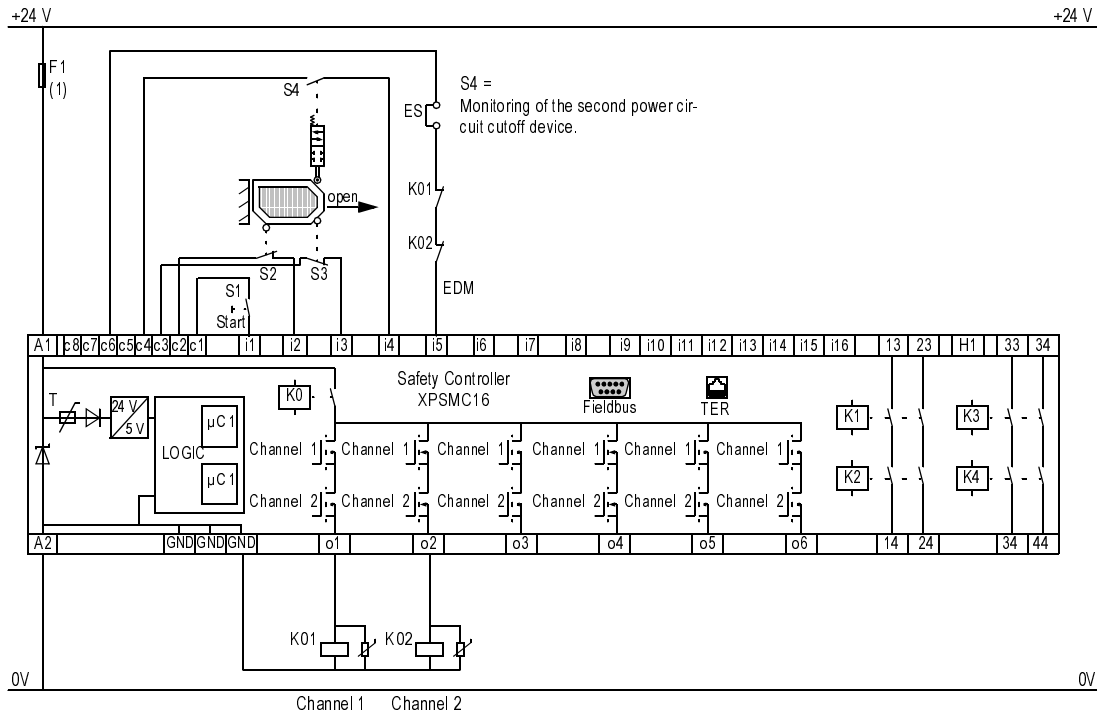
The following functional diagram shows the Safety Guard with One Channel with Start Interlock and different Start Functions:





## Wiring Diagram

The following wiring diagram shows the Injection Molding with Start Functions:



## EDM External Device Monitoring

### ESC External Start Conditions

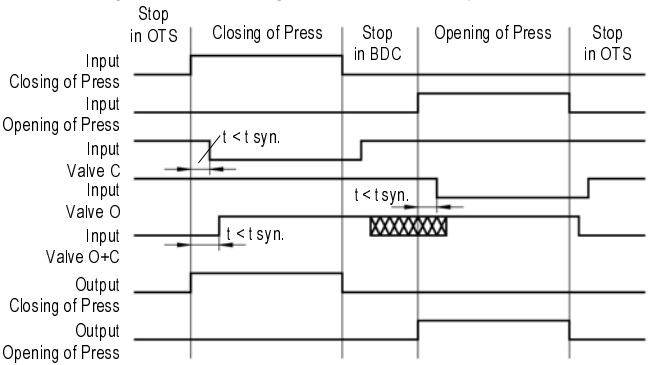
**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.

The static outputs are rated category 4 according to EN954-1.

# Hydraulic Press Valve Monitoring

## Functional Diagram

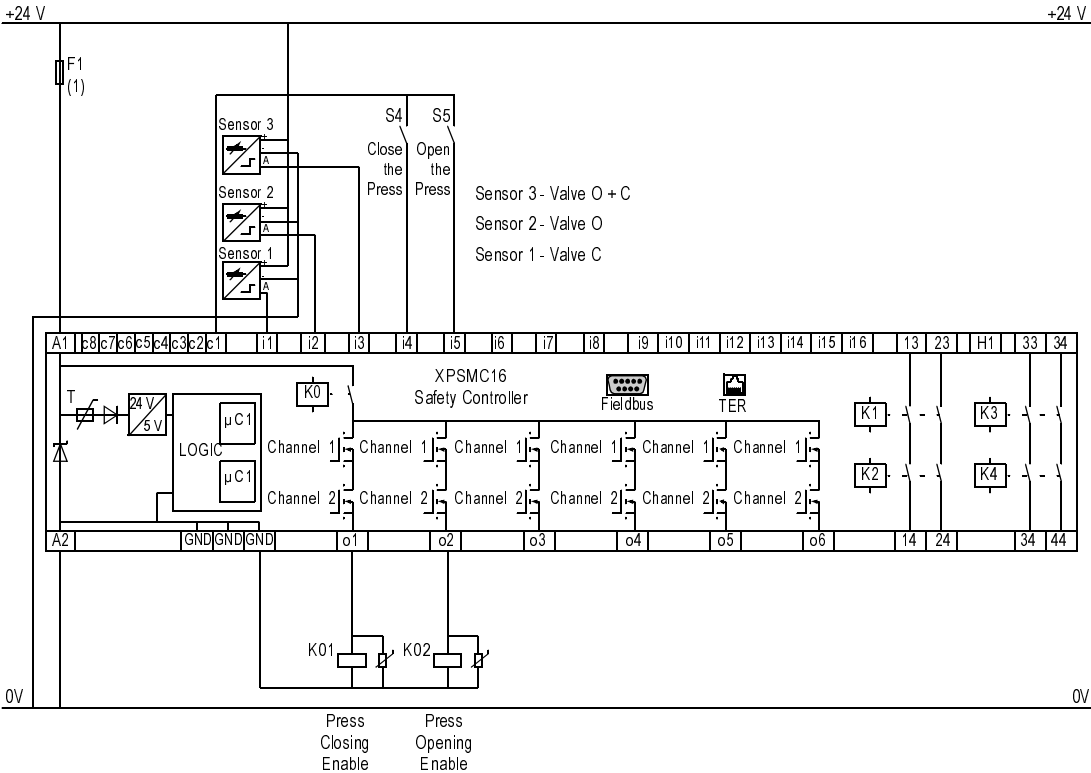
The following functional diagram shows the Hydraulic Press Valve Monitoring:



Sensor signals at valve level:

Valve	Sensor	Stop (Opened)	Pressing (Closing)	Stop (Closed)	Retraction (Opening)
Valve C	1	High	Low	High	Low
Valve O	2	Low	High	Low	High
Valve O + C	3	High	High	Low	Low

**Wiring Diagram**      The following wiring diagram shows the Hydraulic Press Valve Monitoring:



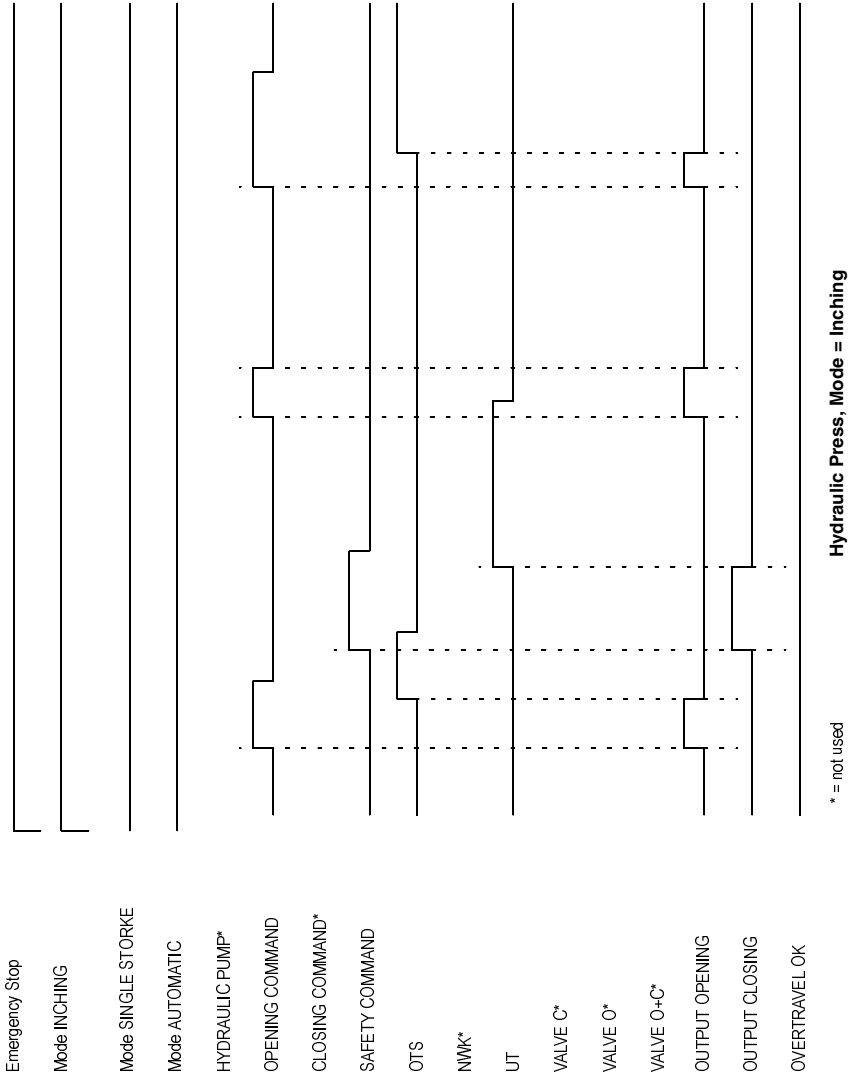
**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.  
The static outputs are rated category 4 according to EN954-1.



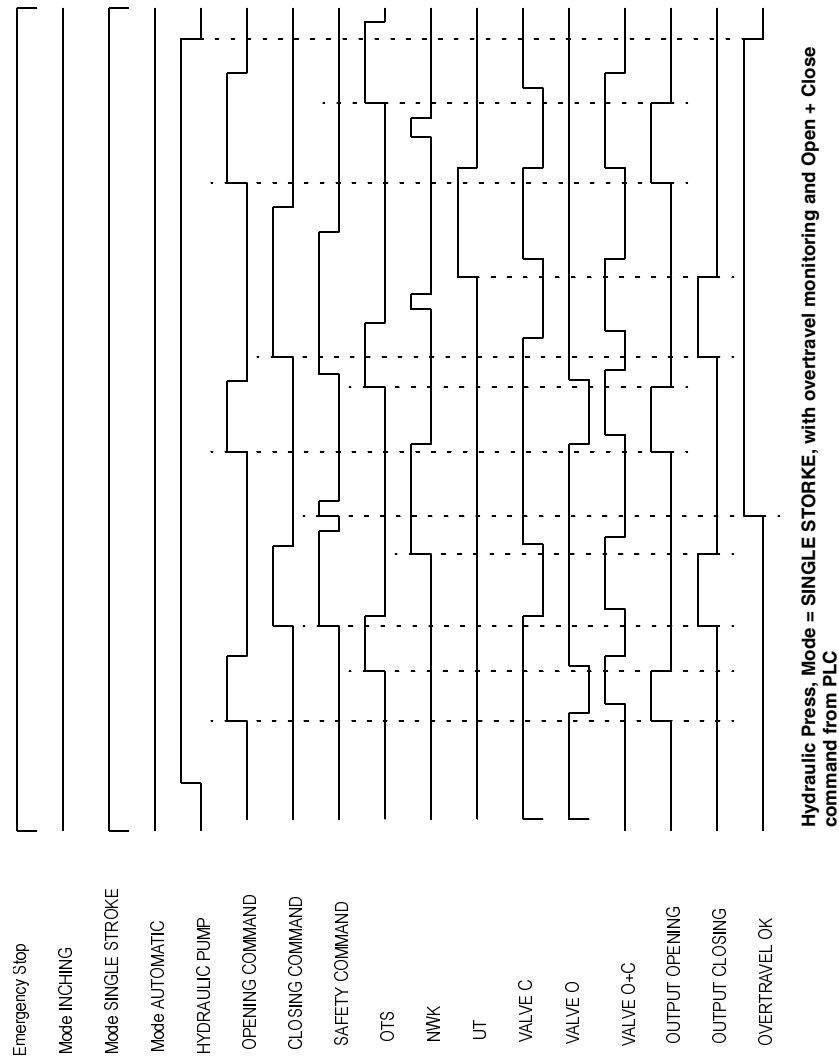
## Hydraulic Press 2

### Functional Diagrams

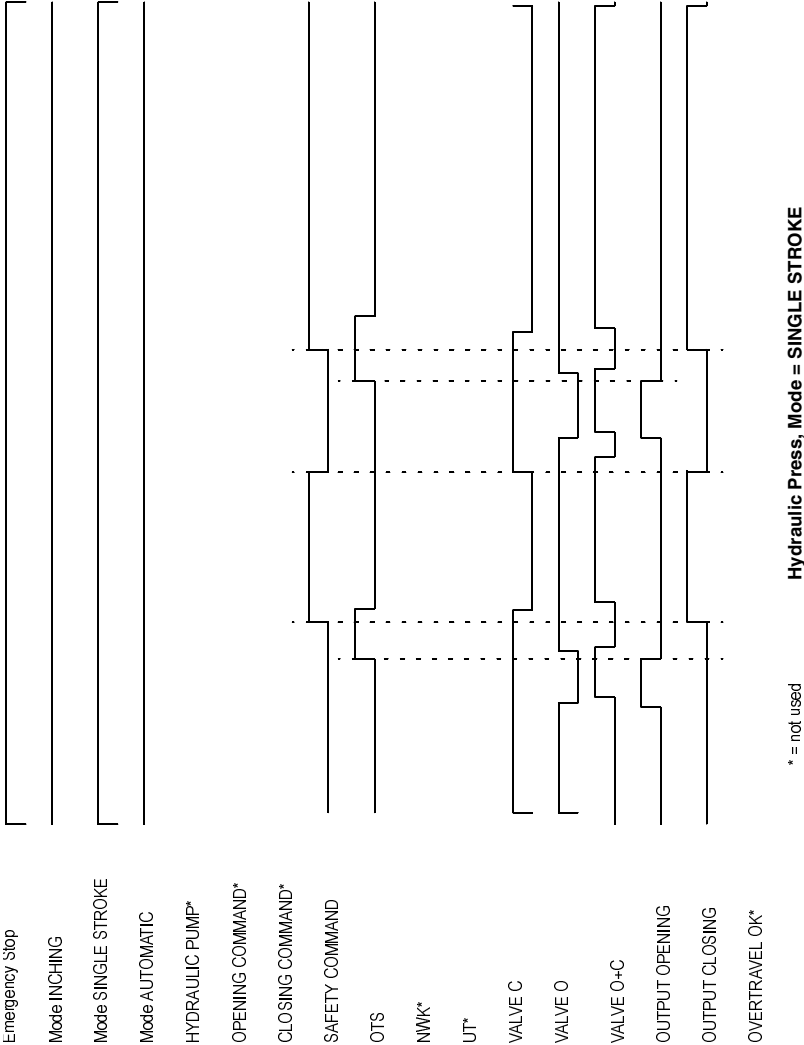
The following functional diagram shows the Hydraulic Press 2, Mode = INCHING



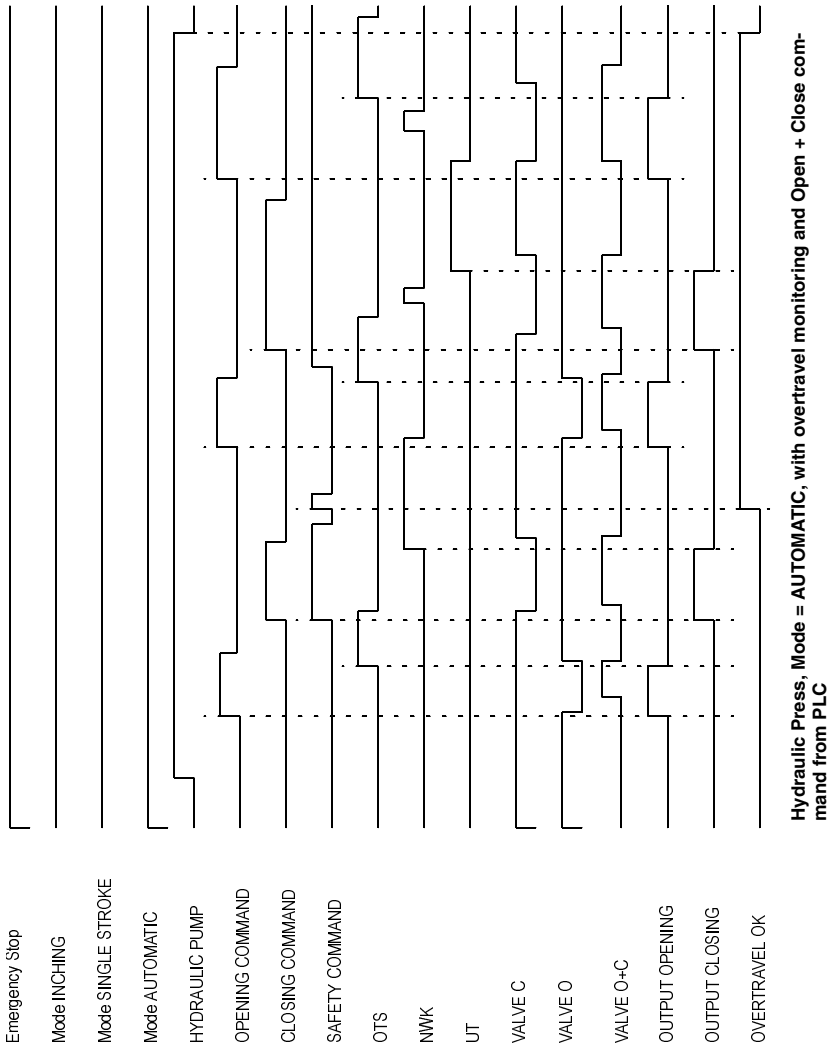
The following functional diagram shows the Hydraulic Press 2, Mode = SINGLE STROKE, with overtravel monitoring and *Open* + *Close* command from the PLC:



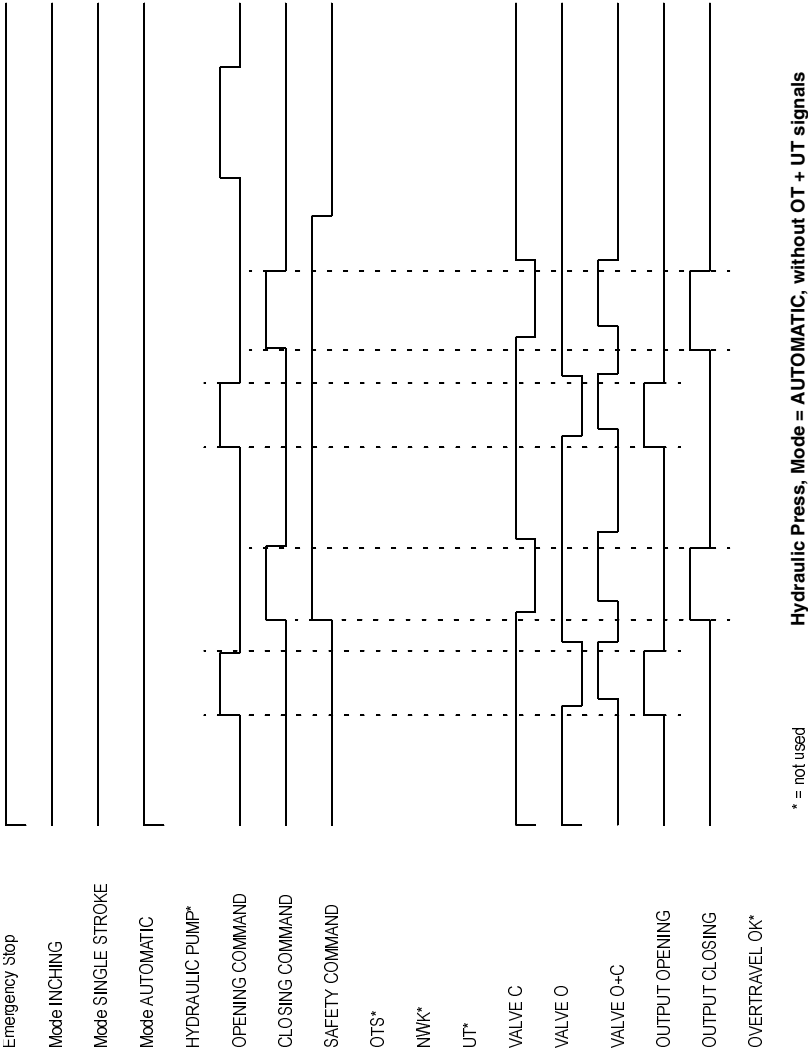
The following functional diagram shows the Hydraulic Press 2, Mode = SINGLE STROKE:



The following functional diagram shows the Hydraulic Press 2, Mode = Automatic, with overtravel monitoring and **Open + Close** command from the PLC:



The following functional diagram shows the Hydraulic Press 2, Mode = AUTOMATIC, without OT + UT signals:

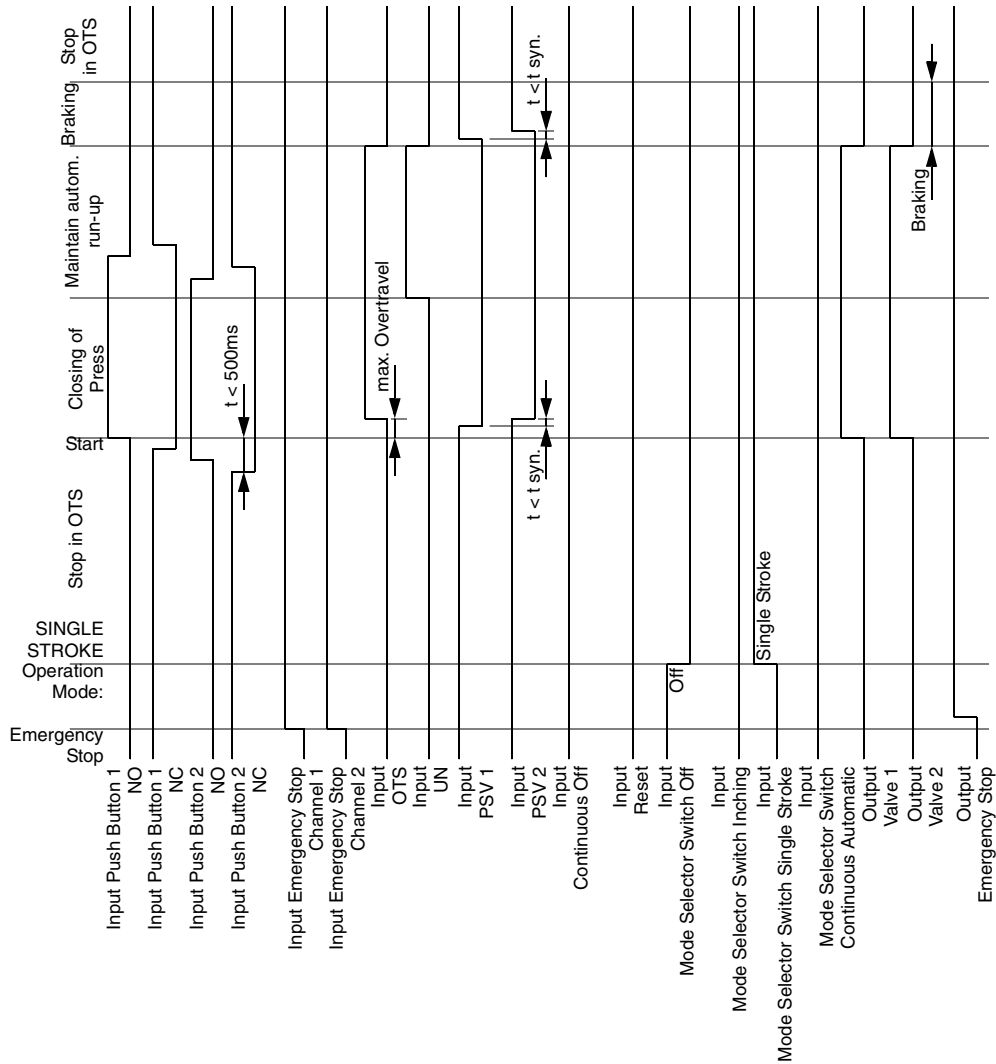




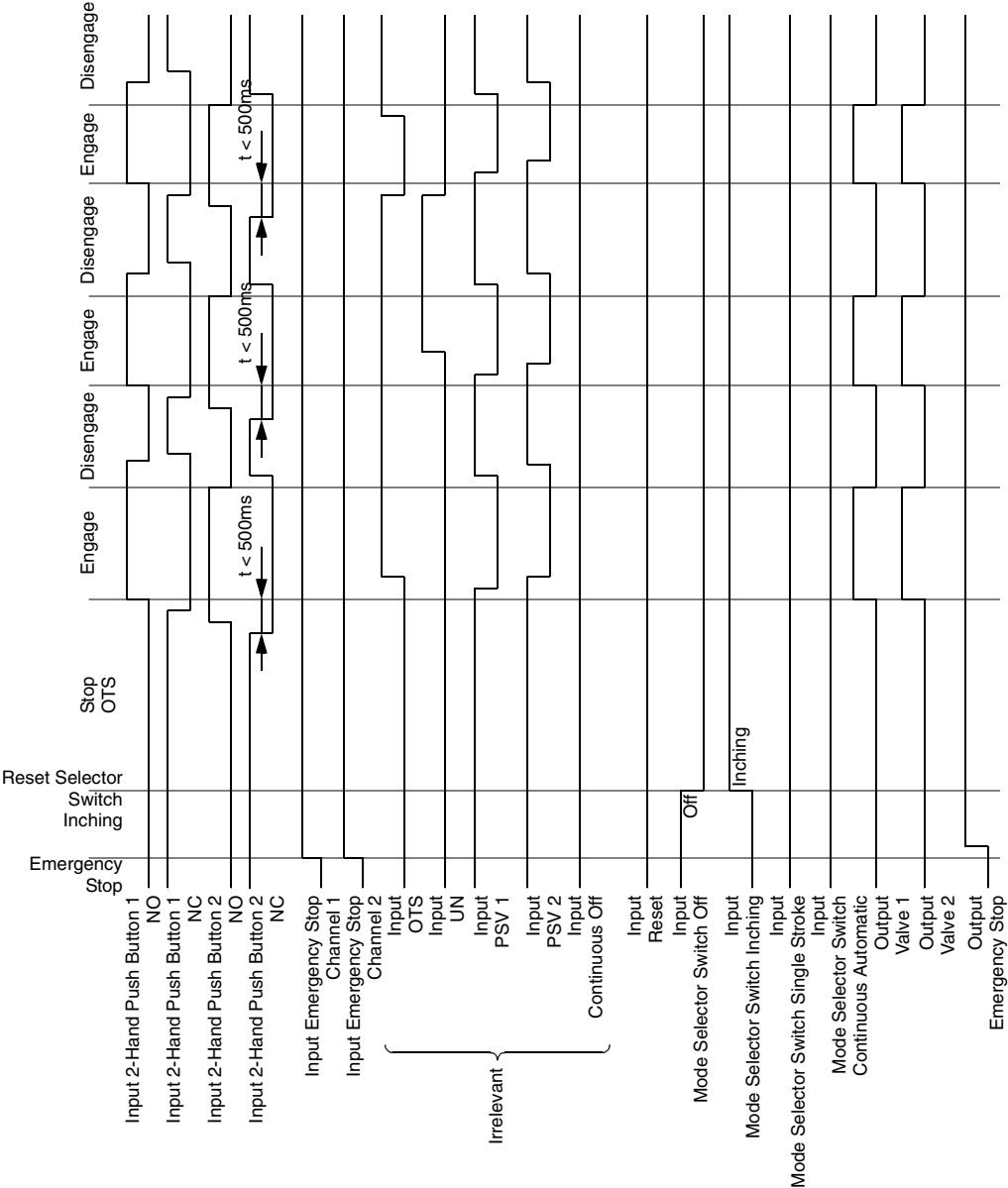
**Eccentric Press**

## Functional Diagrams

The following functional diagram shows the Eccentric Press, Mode = SINGLE STROKE

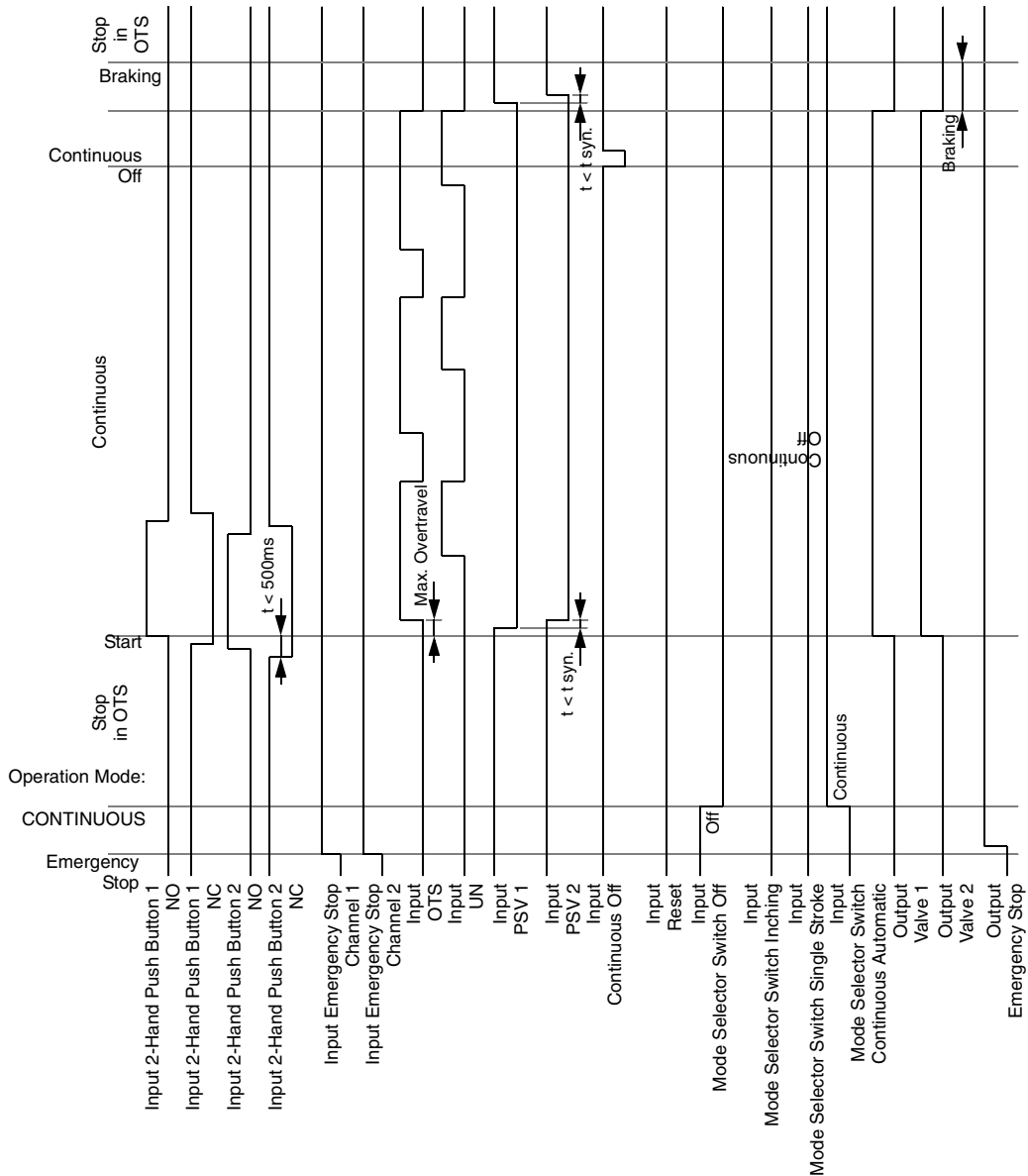


The following functional diagram shows the Eccentric Press, Mode = INCHING





The following functional diagram shows the Eccentric press, Mode = CONTINUOUS



## Wiring Diagram

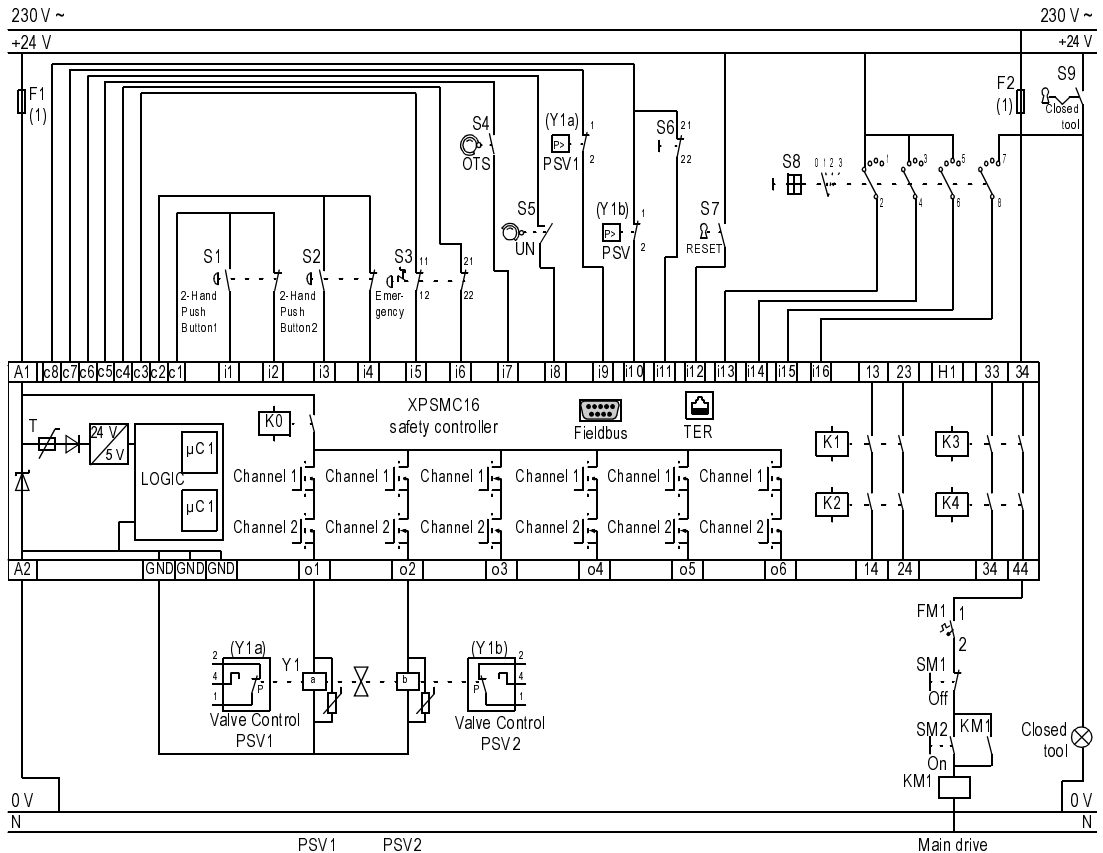
**⚠ DANGER**

**HAZARDOUS VOLTAGE**

Disconnect all power before servicing equipment.

**Failure to follow these instructions will result in death or serious injury.**

The following wiring diagram shows the Eccentric Press:



**OTS** Top Dead Center

**PSV** Safety Valve

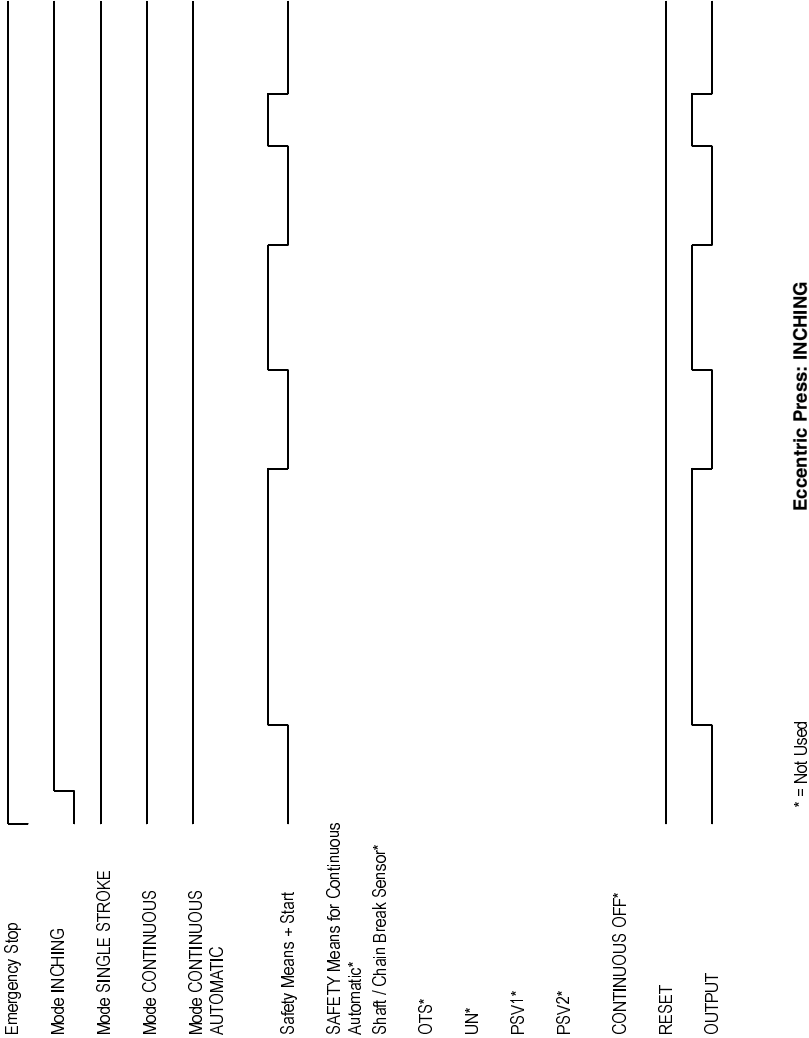
**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.

The static outputs are rated category 4 according to EN954-1.

Eccentric Press 2

Functional  
Diagram

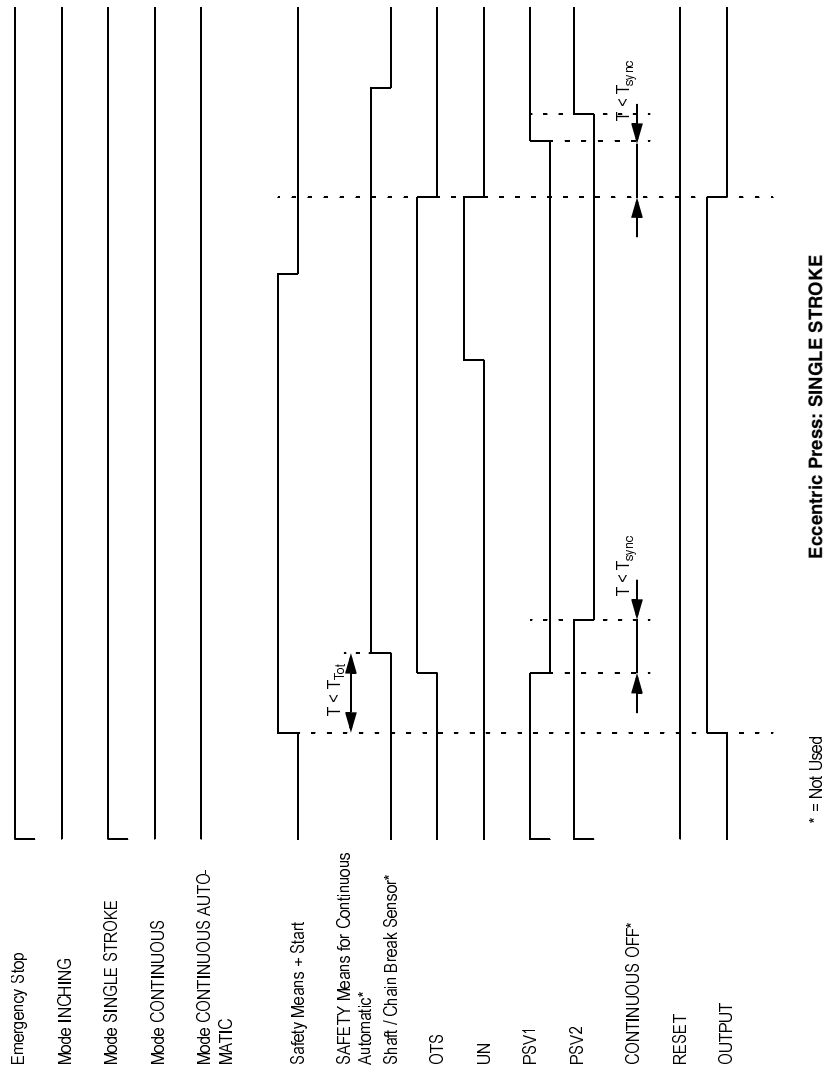
The following functional diagram shows the Eccentric Press 2, Mode = INCHING:



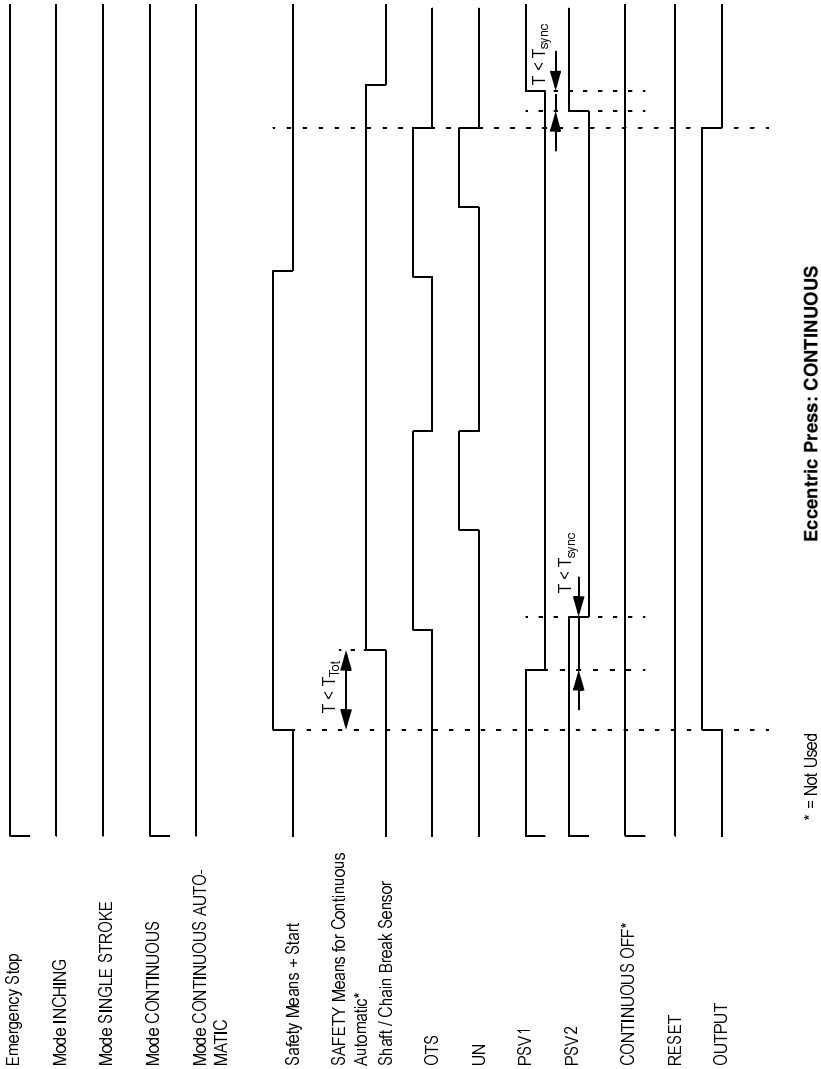
\* = Not Used

Eccentric Press: INCHING

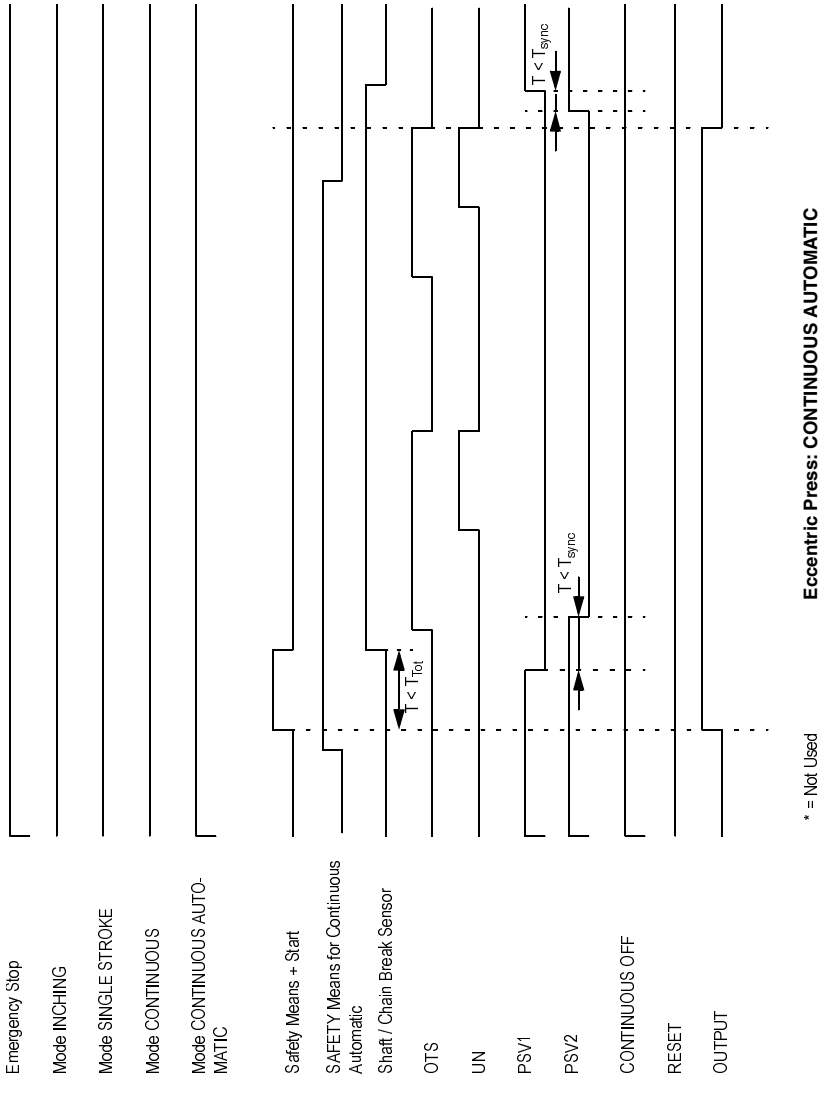
The following functional diagram shows the Eccentric Press 2, Mode = SINGLE STROKE:



The following functional diagram shows the Eccentric Press 2, Mode = CONTINUOUS:



The following functional diagram shows the Eccentric Press 2, Mode = CONTINUOUS AUTOMATIC:

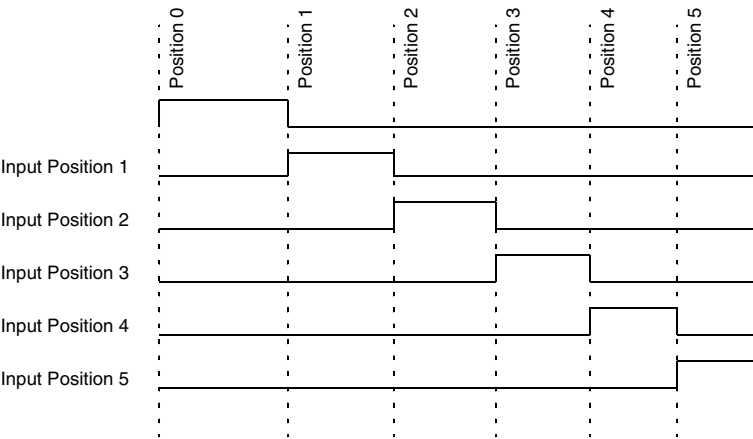




## Selector Switch

### Functional Diagram

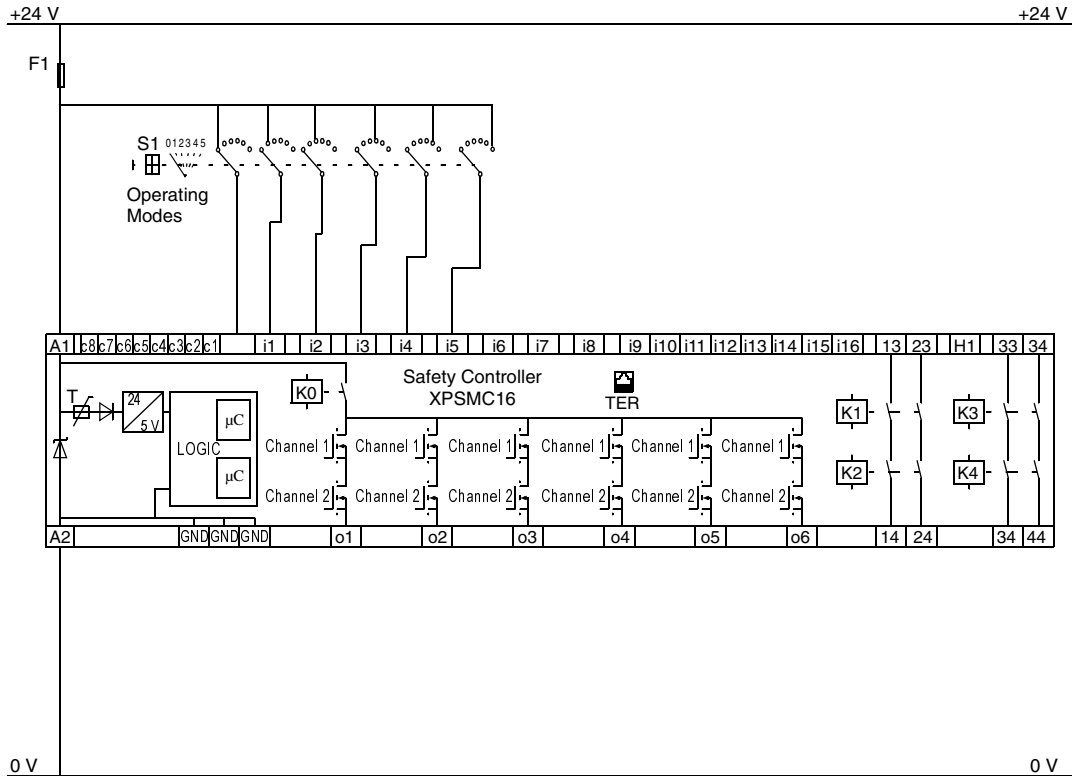
The following image represents the functional diagram of the Selector Switch device:



The static outputs are rated category 4 according to EN954-1.



**Wiring Diagram** The following two images represent the wiring diagrams of the Selector Switch device:

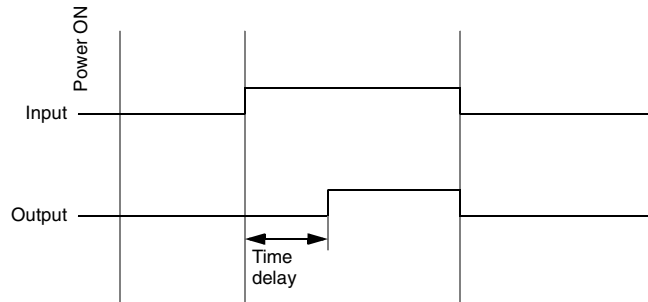


## Timer

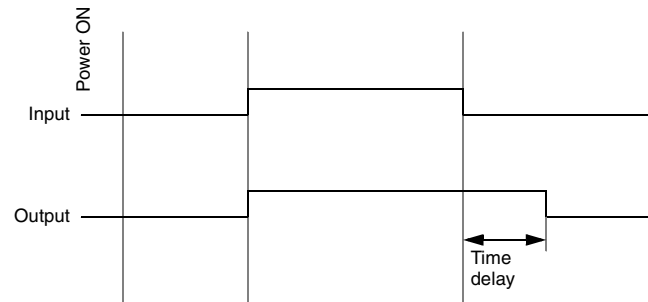
### Functional Diagram

The following image represents the functional diagram of the Timer device for the On-/Off-Delay:

On-Delay

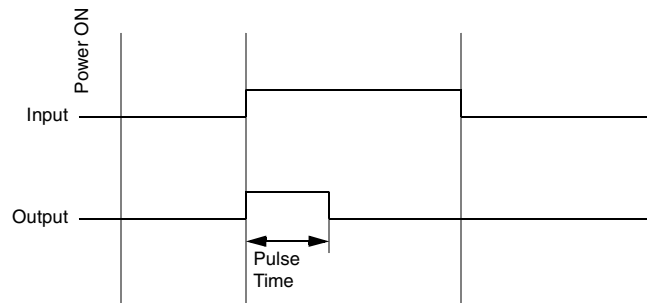


Off-Delay

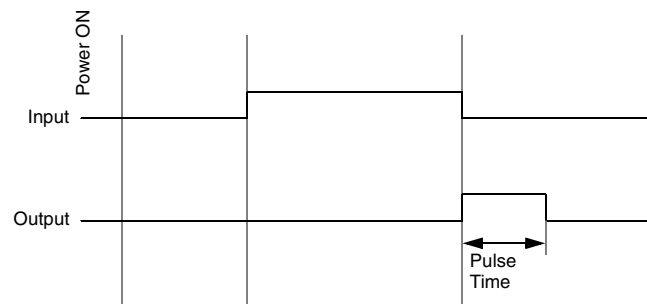


The following image represents the functional diagram of the Timer device for the On-/Off Pulse:

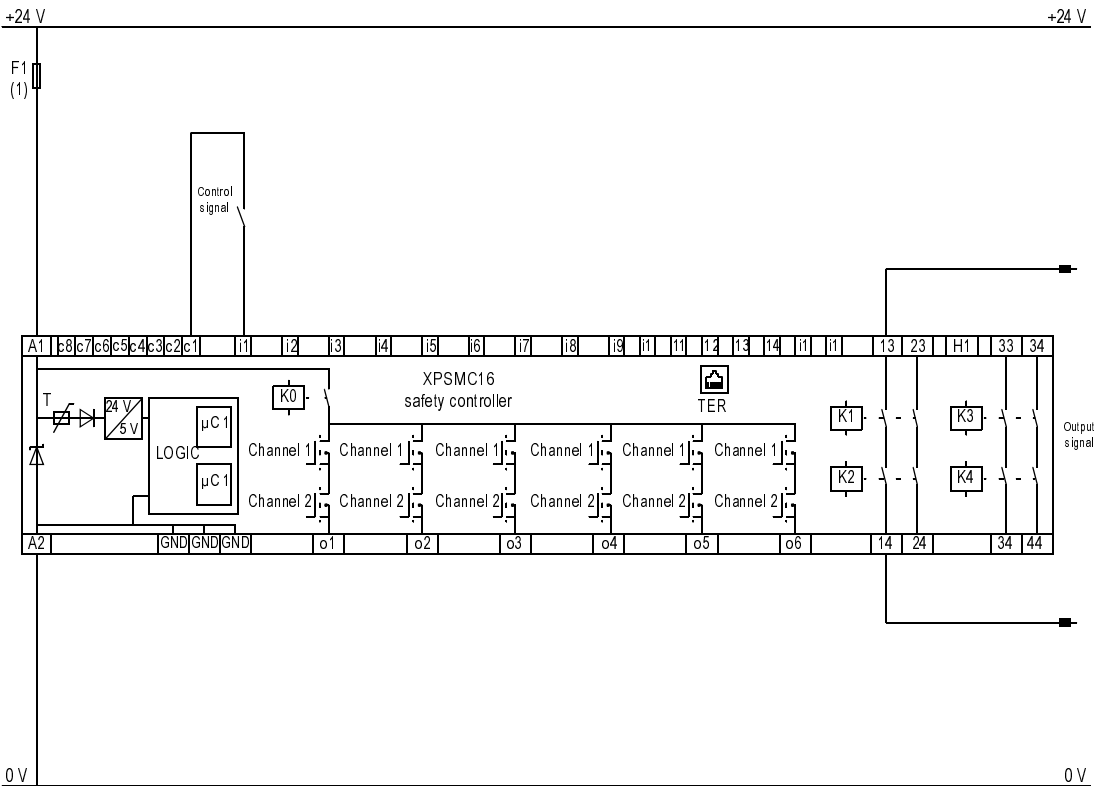
On Pulse



Off Pulse



**Wiring Diagram**     The following image represents the wiring diagram of the Timer device:

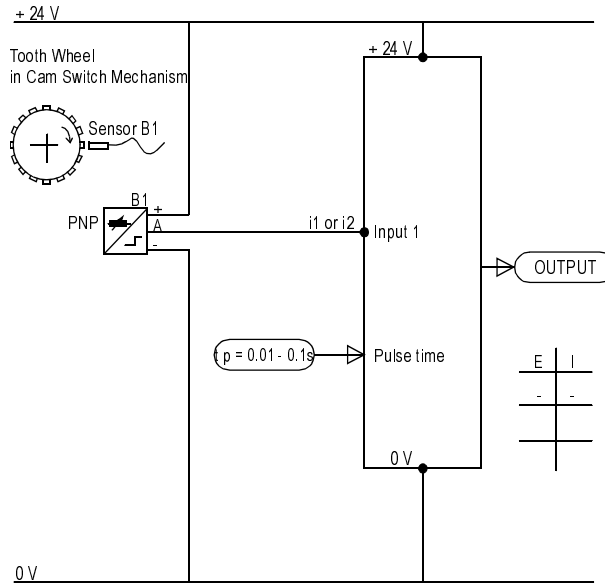


(1) See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.  
The static outputs are rated category 4 according to EN954-1.

## Shaft/Chain-Break Monitoring

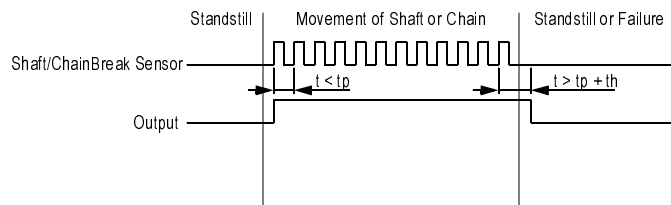
### GBS Function Diagram

The following diagram shows the GBS function of the Shaft/Break-Chain Monitoring device:

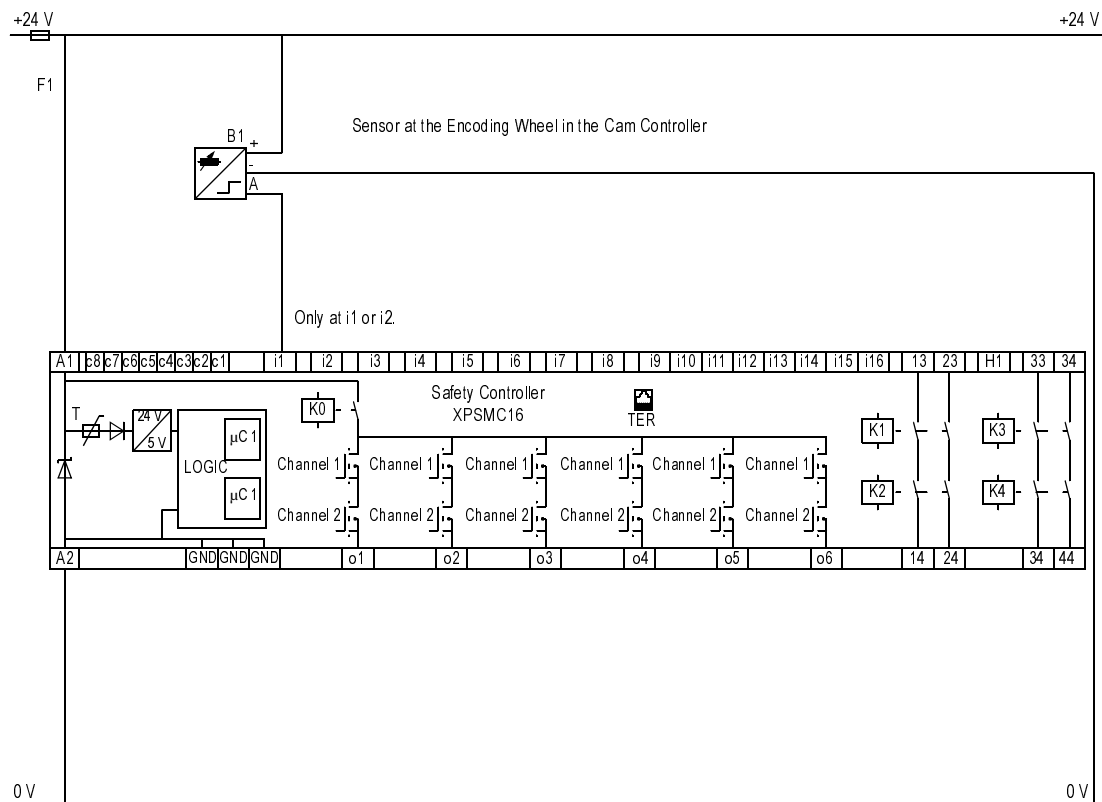


### Sensor Position

The following diagram shows the Shaft/Chain-Break Monitoring function when the sensor is high or low at standstill:



**Wiring Diagram**     The following image is the Shaft/Chain-Break Monitoring wiring diagram:

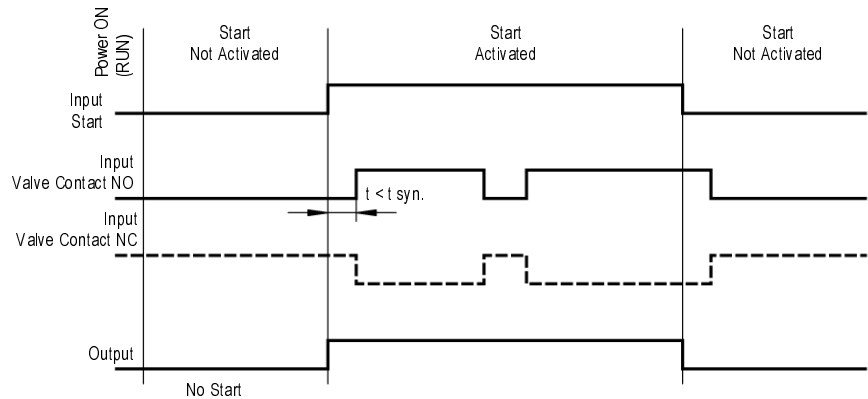


The static outputs are rated category 4 according to EN954-1.

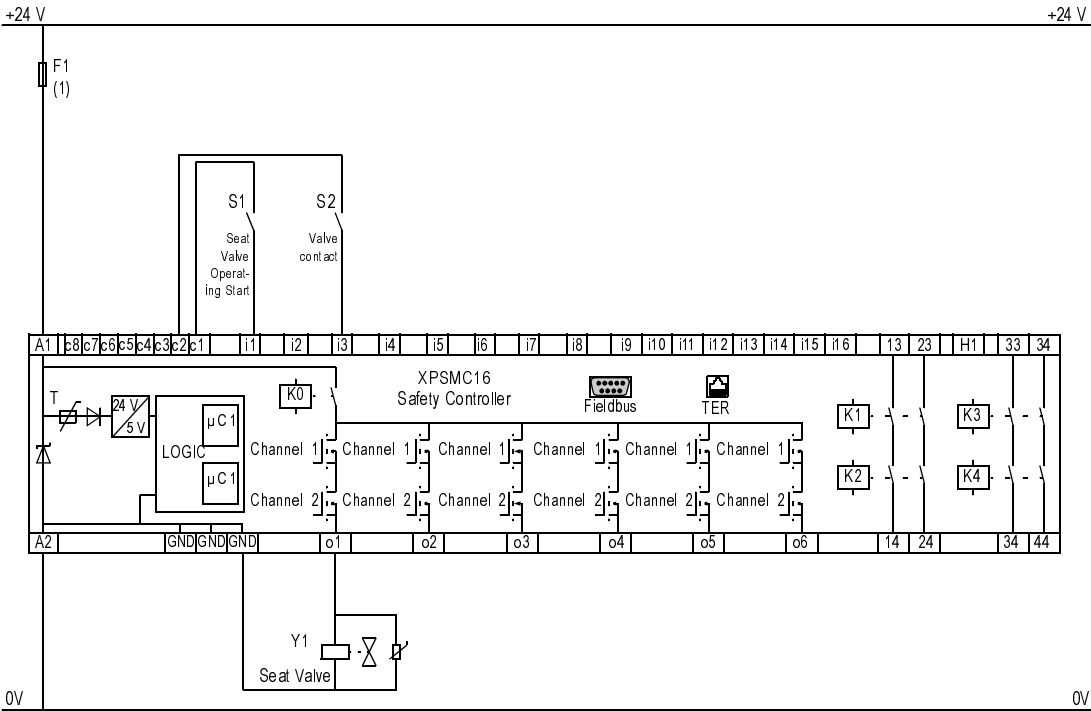
## Seat Valve Monitoring

### Functional Diagram

The following image represents the functional diagram of the Seat Valve Monitoring device:



**Wiring Diagram**     The following image represents the wiring diagram of the Seat Valve Monitoring device:



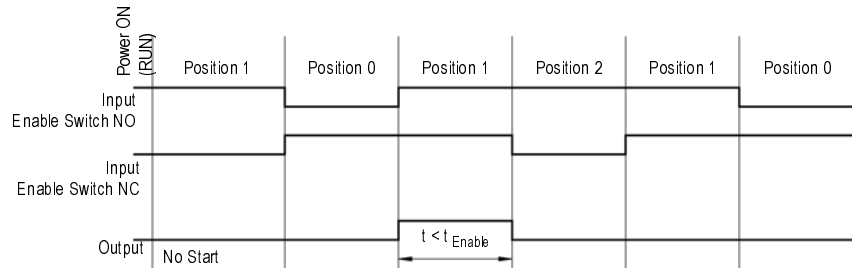
**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.  
The static outputs are rated category 4 according to EN954-1.



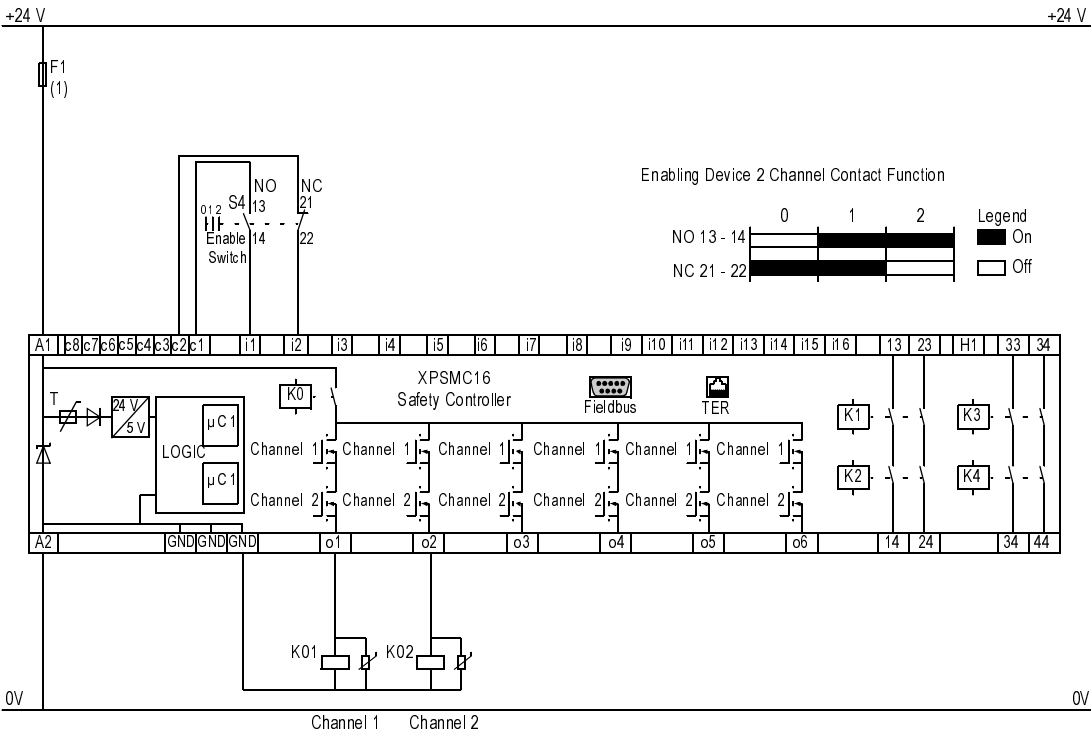
## Enabling Device 2 Channel

### Functional Diagram

The following diagram represents the functional diagram of the Enabling Device 2 Channel:



**Wiring Diagram**      The following diagram represents the wiring diagram of the Enabling Device 2 Channel:



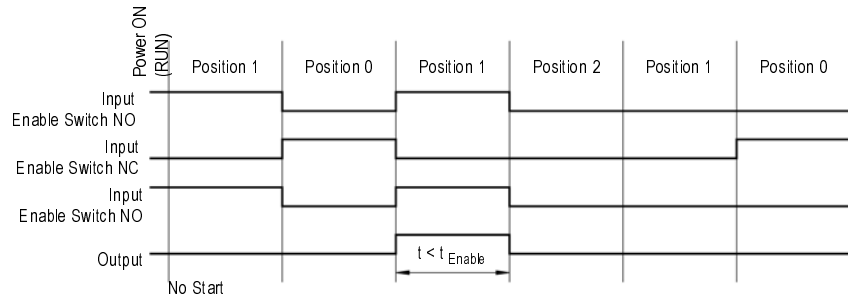
**(1)** See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.  
The static outputs are rated category 4 according to EN954-1.

**Note:** XPSMC32 with 32 inputs i1...i32, otherwise identical.

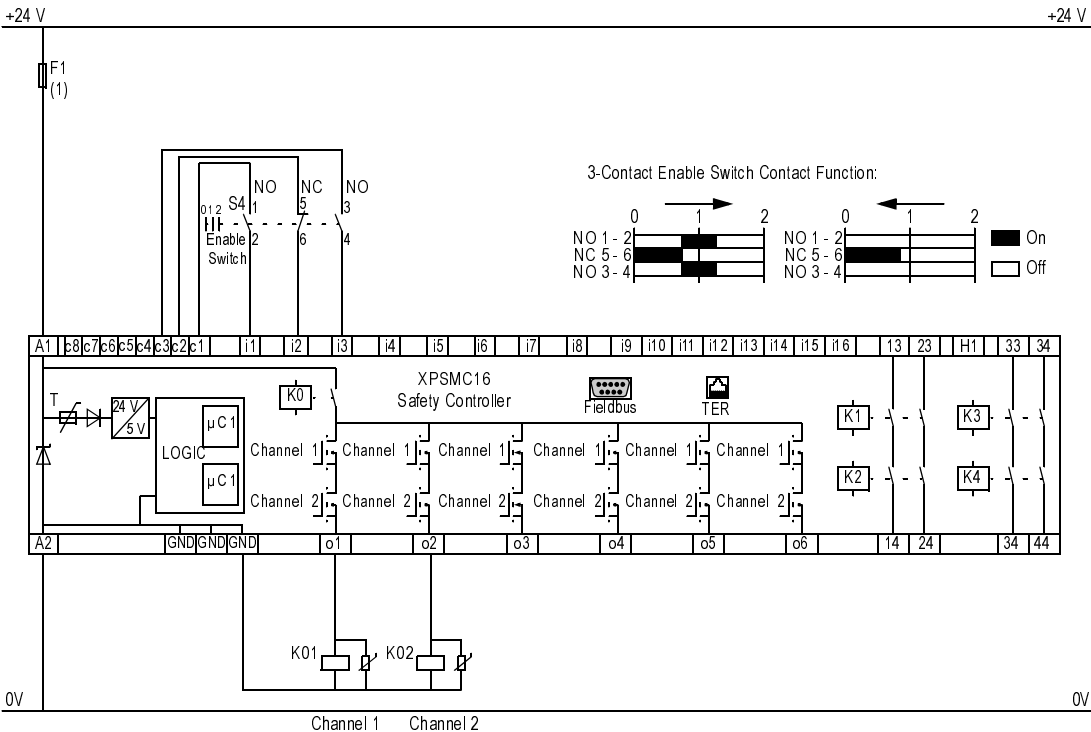
## Enabling Device 3 Channel

### Functional Diagram

The following diagram represents the functional diagram of the 3-contact Enable Switch:



**Wiring Diagram**     The following diagram represents the wiring diaram of the 3-contact Enable Switch:



(1) See Technical Data in XPSMC safety controller Hardware manual for maximum fuse sizes.  
The static outputs are rated category 4 according to EN954-1.

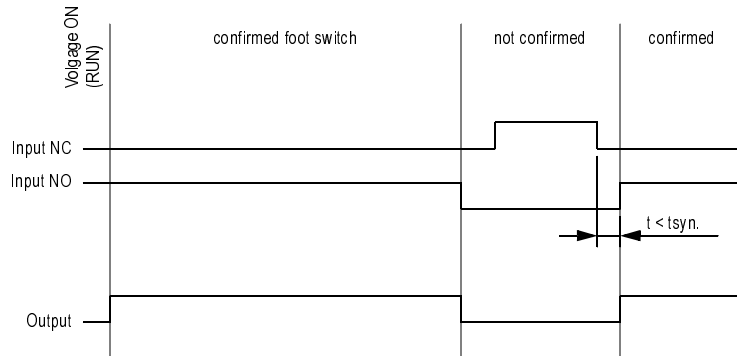
**Note:** XPSMC32 with 32 inputs i1...i32, otherwise identical.

## Foot Switch

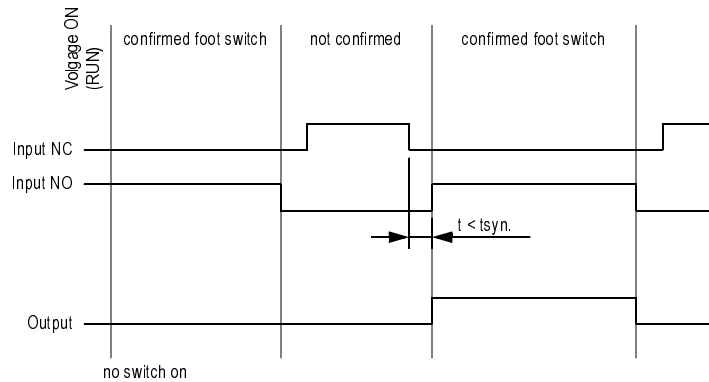
### Functional Diagram

The following images represents the Foot Switch functional diagram:

Start interlock = NO

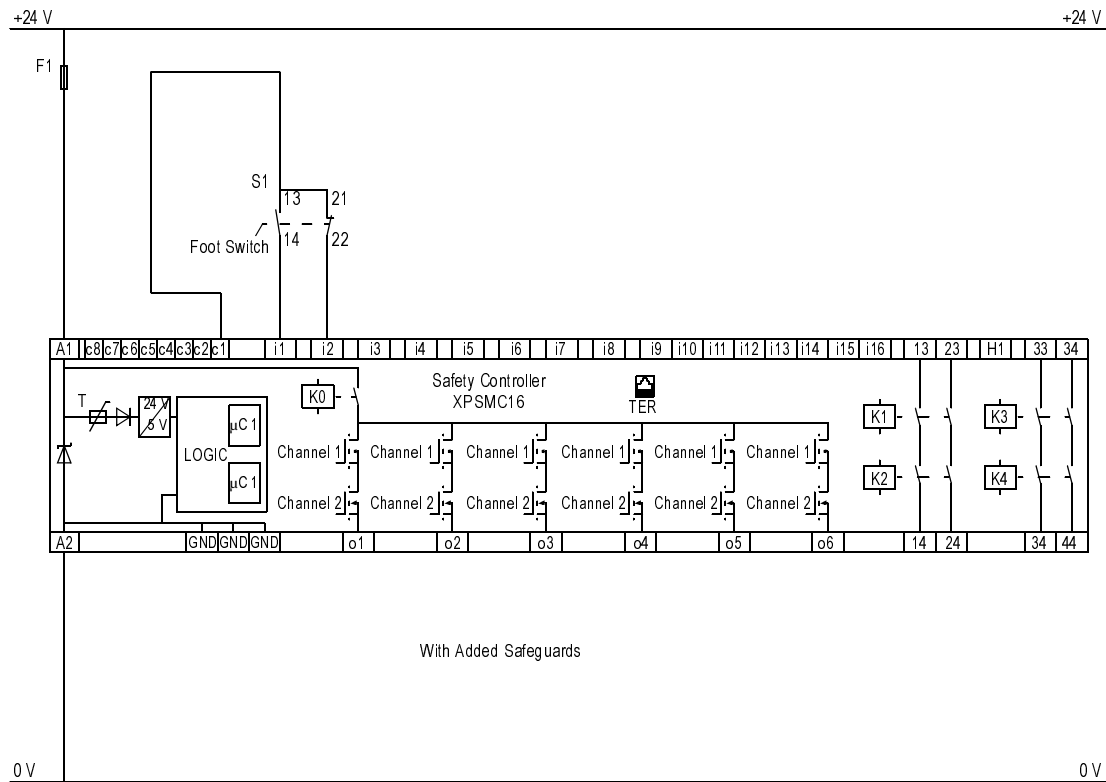


Start interlock = YES



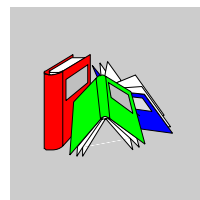
The static outputs are rated category 4 according to EN954-1.

Wiring Diagram      The following image represents the Foot Switch wiring diagram:



---

## Glossary



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### E

<b>EDM</b>	external device monitoring
<b>ESC</b>	external start conditions
<b>ESPE</b>	electro sensible protective equipment

---

### O

<b>OSSD</b>	output safety switching device
<b>OTS</b>	top dead center (Oberer Totpunktschalter)

---

### R

<b>RUN Mode</b>	XPSMC functional status during which the connected circuit members are monitored and the safety outputs are switched.
-----------------	---

---

**S**

<b>Safety Input</b>	Monitored input for connection of switching devices. By using various control outputs (c1...c8) to power the safety inputs, cross-connections, external voltage and earth connections can be detected on the safety inputs.
<b>Safety Outputs</b>	Relay or solid-state output activated by the XPSMC logic unit, which are able to cut off the subordinate control elements.
<b>Synchronization Time</b>	maximum time difference allowed between the appearance of 2 input signals

---

**T**

<b>TER (Connector for Terminal)</b>	8 pin RJ45 connector for the connections of a PC for the configuration or diagnostic (bus system with Modbus protocol) or connections of another Modbus module (PLC, terminals, etc. ...).
-------------------------------------	--

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**V**

<b>VDC</b>	validation counter
------------	--------------------

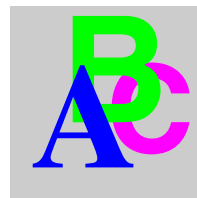
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